OCTOBER • 1947

TOOL & DIE JOURNAL

DESIGN, MANUFACTURE AND USE OF PRODUCTION TOOLING

PUTNAM

Continuous Pilot

COUNTERBORES

. . . for longer tool life and greater economy

- Continuous pilot extends throughout the extra long fluted section.

- Straight or tapered shanks.
- Sizes range from No. 6 cap screw to 1" screw.

Note the long spiralling chips produced by the fast helix design of Putnam Hi-Speed Counterbores.

The Putnam-designed fast helix provides easier, smoother, faster cutting . . . cuts more holes before requiring resharpening. More resharpenings, too, are possible because of the much longer flutes of the Putnam Continuous Pilot Counterbore. Cutting edges may be ground back time after time, as they become worn. It's the counterbore that gives you exceptionally longer tool life and real tool economy. Call your Putnam Distributor today.

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Forging and Casting Division

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Small, powerful (clamping pressures from a fraction of a pound to 500 lbs. or more) the Bellows CV40-B Air-operated Vise is the ideal holding unit for light milling, drilling, tapping, reaming, and other machine operations.

Jaw width is 4" with the jaw opening adjustable up to 2¼". Removable soft steel false jaws can be milled to almost any shape.

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Write for Bulletin CV40-BM

The Bellows Co.

ESTABLISHED 1911

AKRON, OHIO

TOOL & DIE JOURNAL

Editorial and Publication Offices 2460 FAIRMOUNT BOULEVARD ● CLEVELAND 6, OHIO

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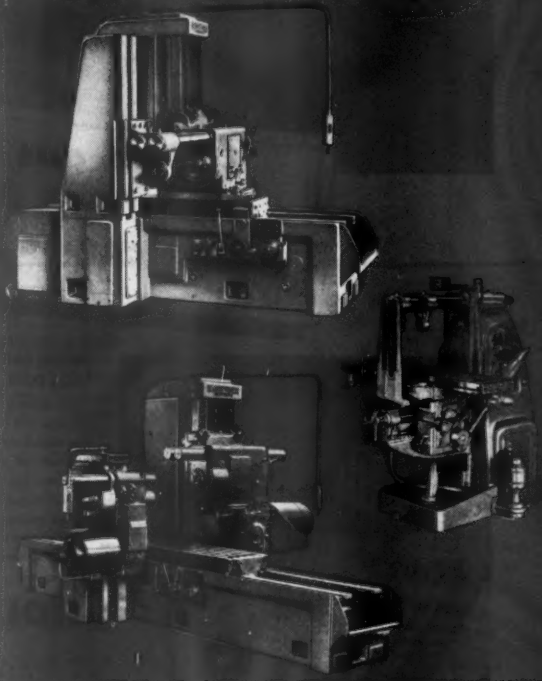
Kearney & Trecker announces new in accuracy . . First in rigidity . .

MILLING MACHINES AT THEIR BEST— DESIGNED TO PUSH COST CURVES DOWN

New! Kearney & Trecker-Milwaukee Series of Simplex Bed-Type Milling Machines
These machines bring you a completely new design with a combination of exceptionally wide working ranges and horsepower capacities for most effective use of modern cutting tools.

The new Kearney & Trecker — Milwaukee Model E simplified milling machine
This machine incorporates every fundamental requirement for either foreign or domestic use. Modern design plus economy of parts offers you highest dollar for dollar efficiency obtainable.

Duplex Bed-Type Milling Machines offer 48 different working ranges and horsepower combinations
Machines that offer custom-built possibilities for your work at standard machine costs to you. Truly an entirely new concept in bed-type design — they use all modern cutting tools to maximum effectiveness.



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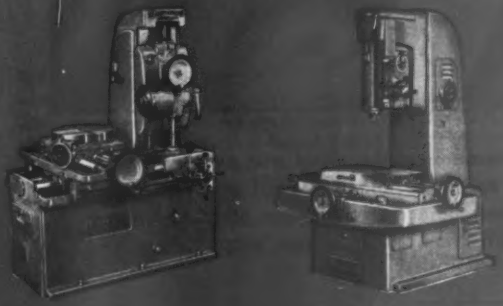
FIRST IN COST-CUTTING

outstanding machine tools . . . First First in all-round performance!

World's most advanced milling machine
The new Model 5D combines bed-type machine working range with revolutionary Kearney & Trecker Rotary-Head Principle of Milling. Mills any geometric shape, in horizontal or vertical planes, directly from blue print, without models or templets. For versatility of application, it leaves nothing to be desired.

2 BORING MACHINES AT THEIR BEST— DESIGNED TO PUSH PRECISION CURVES UP



America's finest precision boring machines
The Model B Autometric (left) for horizontal work and the Model C Autometric (right) for vertical work. Each machine is the direct result of nearly a half-century of experience and several years of intensive research in design and manufacture of precision machine tools. Every refinement, of a practical nature, that can be used in performing highly accurate work has been incorporated in these machines.

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Buy from the oldest manufacturers in the world with over a century and a third of experience and reputation. GROBET produces more Rifflers, in more shapes and more sizes than any other company. Demand a set of GROBET RIFFLERS from your supplier — you'll never change.

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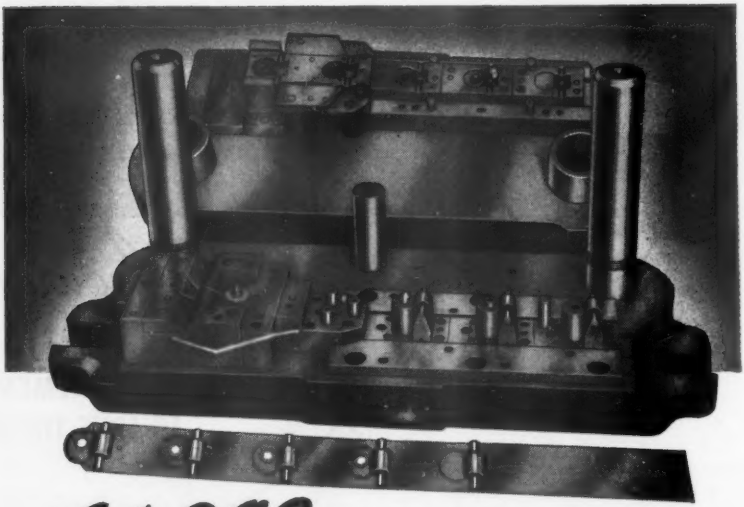

160,000 PIECES BETWEEN GRINDS

AND A LIFE OF Fifteen Million!

These parts were made with a Cromovan six station punch and die from .032 cold rolled coils on slide feed fully automatic press. They were produced by Publix Metal Products, Inc., N. Y.

This CROMOVAN DIE was used in the production of housings for the tilt mechanism of venetian blind hardware. Its performance attests again the high quality and desirable characteristics of Cromovan die steel for high production, accuracy and unusually long life.

Call **Firth Sterling**

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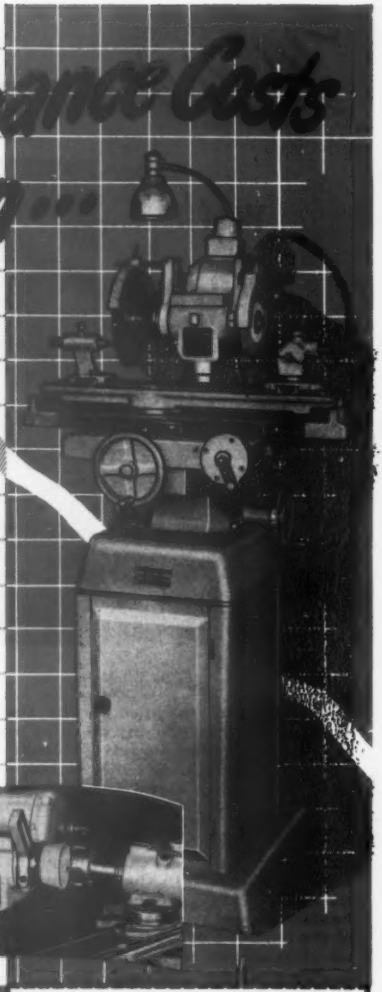
Tool Maintenance Costs Come Down...

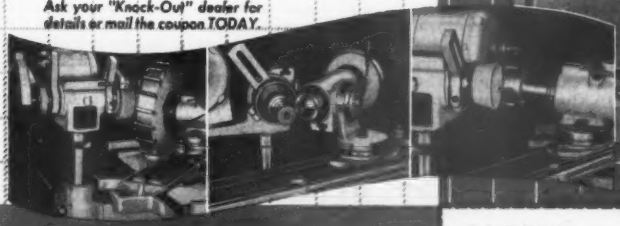
WHEN YOU USE A "KNOCK-OUT" Universal Cutter Grinder



Tool Maintenance Costs Come Down when you use a "Knock-Out" Universal Cutter Grinder.

Set-ups are simpler, easier to make—less time is lost between jobs—more tools of all types can be properly reconditioned at less cost with a "Knock-Out" Universal Cutter Grinder. Handles internal, external and surface grinding too. A "Knock-Out" Universal Cutter Grinder is the busiest machine in *any* Tool Room.

Ask your "Knock-Out" dealer for details or mail the coupon TODAY.



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ABERDEEN, SO. DAK.

MANUFACTURERS OF MACHINE TOOLS AND AUTOMOTIVE MAINTENANCE EQUIPMENT

K. O. LEE COMPANY 10
1115 First Ave. S. E., Aberdeen, S. D.
Please send us complete details on "Knock-Out" Universal Cutter Grinders.

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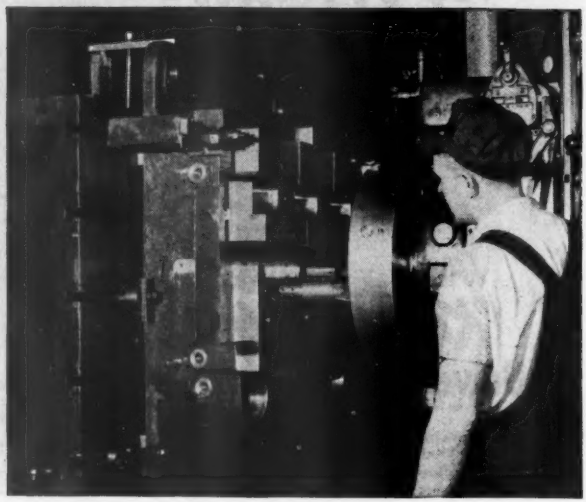
CITY_____ STATE_____

Now Danly Special Die Sets

with any additional machining required



New equipment installed in the Danly shop permits us to do any machine work on large or complex die sets incidental to the mounting of the dies. Inserts, recesses, additional boring, keyways and other machining can be done to the customer's specifications.

Time is saved by this service as work on dies and on the die set can be done at the same time. It permits the die shop or tool room to devote their equipment and man hours to the making of dies. The problem of the handling of big sets, for which the die shop or tool room are not generally equipped to do economically, is also solved by this service.

These special die sets are then delivered ready for the mounting of the dies. Note the size and complexity of the die set shown on this page. This die set—machined at Danly—is an example of the additional machining and service which this company offers.

On your next special die set inquiry include the additional machining work that you wish done at Danly while the die set is being made. The cost of this machining will be shown as a separate item in the quotation.

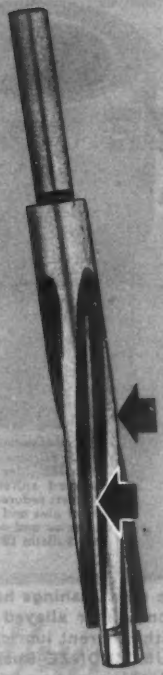
DANLY MACHINE SPECIALTIES, INC.

2100 South 52nd Avenue • Chicago 50, Illinois

Branches in Principal Cities

DANLY *Special* DIE SETS

MACHINED TO YOUR SPECIFICATIONS



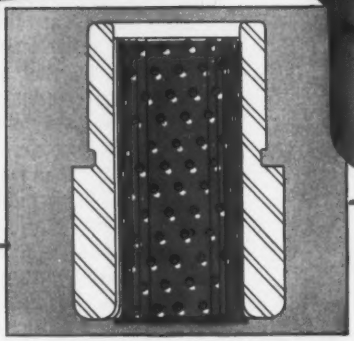
NEW Mohawk "lifetime" counterbore with blades that can be sharpened without waste for its entire length and integral, sub-land, precision, radial-ground pilot extending the entire length of the flute. Just sharpen the end of the blades-the pre-ground sub-land grows a new pilot for you. You never have to cut off useful tool life to re-establish a pilot. Write for sizes and prices on stock numbers to Mohawk Tool Company, 21647 Dequindre Road, Hazel Park, Michigan.

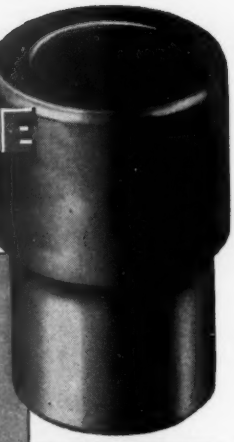
Mohawk

SUB LANDS

NEW → → → →
INDIUM BRONZE
GUIDE PIN BUSHINGS

Increase Accurate Life of Die Sets





Low Friction INDIUM BRONZE liner with indented spherical oil pockets reduces tendency of pins and bushings to seize and wear. Ask for Bulletin LB.

Get more work from your press tools with these new Bushings having a basic hard steel body and special bearing bronze liner alloyed with INDIUM—the non-corroding metallic element with inherent lubricating qualities. "Standard" Steel Die Sets with INDIUM BRONZE Bushings are engineered for superior performance—these Bushings reduce friction . . . assist lubrication and prolong the accurate adjustment of punches and dies. Presses may be operated at higher speeds without increasing tendency to seize. "Standard" INDIUM BRONZE Bushings, in sizes from 1" to 3" I.D. can be substituted for regular steel guide pin bushings in your present sets. Use them with "Standard" super-finished guide pins when making replacements.

Specify INDIUM BRONZE Bushings on new "Standard" Die Sets.

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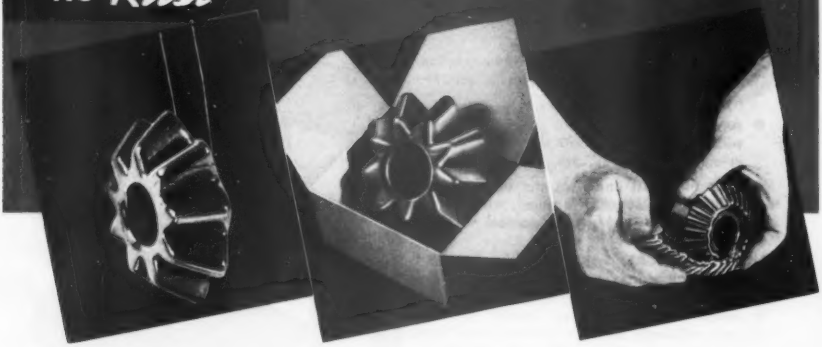
NO *Fuss*
NO *Muss*
NO *Rust*

WITH **Plastic Seal**



DIP IT! **SHIP IT!** **STRIP IT!**

Why: **Because individual hand wrapping and rust-proofing procedures are eliminated all in one operation.**

Plastic-Seal is a tough, pliable, hot-dip coating, easily applied by dipping the object into the molten material and removing almost instantly. The resulting skin-tight film is moisture-proof and protects precision, highly finished surfaces or fragile materials against corrosion and physical damage. No further packaging is required. Transparency makes inspection easy and provides instant identification. Savings in time and material are reduced as much as 90%.

Write for full information. Ask for bulletin 1047.

PS *PRESERVE PROTECT PACKAGE*
with **Plastic Seal**

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SMALL PARTS, TOOLS & DIES

In Your Own Plant

- **Install anywhere by simple wire connection. Quiet in operation. No fumes or odors—no ventilating required.**
- **Any intelligent man can operate furnace with automatic temperature control, using established procedures.**
- **Operating cost under 4¢ per hour to hold 1600° F. in Model 3 furnaces, with 2¢ per kw.-hr. rate. Others in proportion.**

NOW YOU CAN heat treat, harden and temper small parts in your own plant . . . *without experienced heat treaters.* Economical to install and use, Cooley Electric Furnaces operate efficiently at high or low heats, and save your large furnace time for work requiring large volume capacity. Here are some profitable uses:

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Nickel-chromium resistors are embedded in 4 refractory blocks which form the chamber walls. This reduces chemical deterioration from exposure to air . . . protects elements from physical damage . . . assures uniform heating by maintaining correct coil spacing. Units are quickly removable without dismantling furnace.

CHAMBER	8″W 6″H 14″L				10″W 6″H 18″L				8″W 6″H 14″L
FROM COLD	1850° F. in 55-65 min.				1850° F. in 55-65 min.				2000° F. in 2½ hrs.
AMPERES	14.8 at 230 v.				19.6 at 230 v.				20.2 at 230 v
WATTS	3400				4500				4650
MODEL*	MH-3	VH-3	MK-3	VK-3	MH-4	VH-4	MK-4	VK-4	VK-5
PRICE	160.00	185.00	200.00	225.00	245.00	270.00	285.00	310.00	340.00

* M models complete with hinged door and hearth plate.
V models have counterweighted vertical lift door.
K models include Selective Power Modifier for input control to correct temperature lag.

FORCED CIRCULATION AIR DRAW FURNACES — Write for data.

ACCESSORY EQUIPMENT

Electronic operated Veri-tron indicating and controlling pyrometer, with thermocouple and lead wire $143.00
Same in self-contained, enclosed panel including line switch and fuses, with steel stand—completely wired 250.00
Steel stand with shelf 35.00

DEALERS AND DISTRIBUTORS WANTED!

Good territories open on this extensive line of self-contained small electric furnaces. Investigate now.

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Export Manager, 44 Whitehall Street, New York, New York

HY-CO HEINZ

PATENT NO. 2403861

CENTER DRILLS

This photo is 3 times actual size of a patented HY-CO J2 center drill.

TIP CLEARANCE PROLONGS LIFE

Center drill breakage can be reduced only when drills have "Tip Clearance", and only HY-CO Drills have this patented feature. Savings due to tip clearance are phenomenal. HY-CO Drill users (*names on request*) are reporting two to four times increased tool life, and some records (*available*) show savings up to ten times greater than with conventional center drills.

How Tip Clearance Prevents Breakage

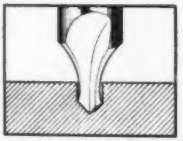
Note from enlarged photo above and the side sketches, that there is a decreased load on the cutting edge. Due to tip clearance there is freedom from binding in the pilot hole, which combined with the greater spiral relief made possible by the drill contour, permits easier flow of chips and less danger of chip jamming. But longer drill life is not the only advantage of HY-CO Center Drills.

Band Contact abolishes out-of-round work

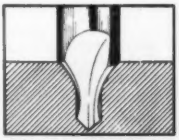
The Sphere-O-Form contour leaves a hole with convex sides. When the 60° machine center enters the curve it automatically establishes a true, never changing center of rotation. This BAND CONTACT ABOLISHES OUT-OF-ROUND WORK and provides increased lubrication for a cooler bearing between work and machine center.

HY-CO Center Drills not only outlast old style center drills, abolish out-of-round work, and increase machine center life, but they eliminate the need for type "B" drills by automatically providing the safety feature of bell-type drills. Write today for complete information, prices and nearest distributor—

HOWARD H. HEINZ, INC., DEPT. TJ, 2525 HILTON ROAD, DETROIT 20, MICHIGAN

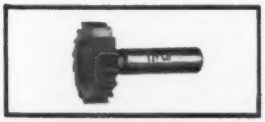


Due to tip clearance only the very tip of a HY-CO drill does the drilling. Normal frictional heat is less; it is created only at tip—is dissipated over radial surface.

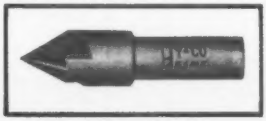


A finished center hole. The Sphere - O - Form contour abolishes FATIGUE POINT —the convex center hole enables the machine center to form a BAND CONTACT which eliminates galled machine centers.

ALSO MANUFACTURERS OF:



Keyseat Cutters



Center Reamers

Countersinks

I'm Using the Carboloy Dresser with the "EDUCATED DIAMONDS"

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Stands Abuse!

You, too, will call this the dresser with "educated" diamonds! . .

Chockful of keen-cutting diamond points that can't come loose . . . stand abuse . this dresser requires no remountings, eliminates all costly loss of diamonds, permits faster traverse speeds, and saves up to 40% in dressing costs!

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Editor's

NOVEMBER BLUEPRINT

Timely • Technical Tell-how Articles

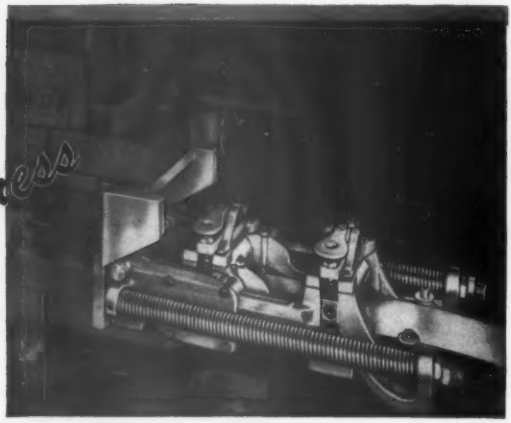
In the Dies and Stampings category a feature entitled, "STAMPING DESIGN AND FABRICATION FOR PORCELAIN ENAMELING" by Carl F. Benner, Assistant Editor, covers the end-use considerations, tooling and production know-how relative to sheet metal parts that are destined to receive a protective and decorative coat of porcelain enamel.

In "PRESS ROOM ACCIDENT PREVENTION" Basil Burns, Chief of Accident Prevention, Western Electric Co., establishes the fact that know-how is not enough to prevent injuries to press room employees. Why do workmen who possess the know-how of job performance and safety rules have accidents? Is it because of a lack of effectiveness in teaching? Does job training adequately control accident causes which arise out of human mistakes? Mr. Burns' answer to these questions are important "reading of the month" to press room superintendents and stamping plant proprietors.

"HYDRAULIC PUMPS AND POWER UNITS" by Arthur B. Riddiford, Jr., John S. Barnes Corporation. This is Part I of our fourth feature presentation of hydraulics know-how from the Machine Design Conference on Hydraulics sponsored by the Cleveland Engineering Society. In this initial installment, Mr. Riddiford covers Hydraulic Structures, Hydraulic Systems, Pumps, Gear Pumps and Piston Pumps. Because of the increasing interest in applications of hydraulics to standard and special machines, holding fixtures and handling devices, Mr. Riddiford's tell-how is of daily-job importance to our tooling and production readers.

"ADJUSTABLE AND DEMOUNTABLE PUNCHES AND DIES." Because the Sheet Metal Industry is constantly seeking ways and means of reducing die costs, such tools as standardized retainers, quickly interchangeable punches and self-contained punch and die units are of increasing importance. This article details the principles and applications of these cost-reducing tools.

Replace Worn Punch Press Feeds



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at Considerable Savings

Dickerman Die Feeds cost much less than old-fashioned feeds and do more accurate, faster work.

They are interchangeable — can be mounted on any type punch press.

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Maintenance expense is negligible due to the absence of wearing parts, also their accurate and rugged construction.

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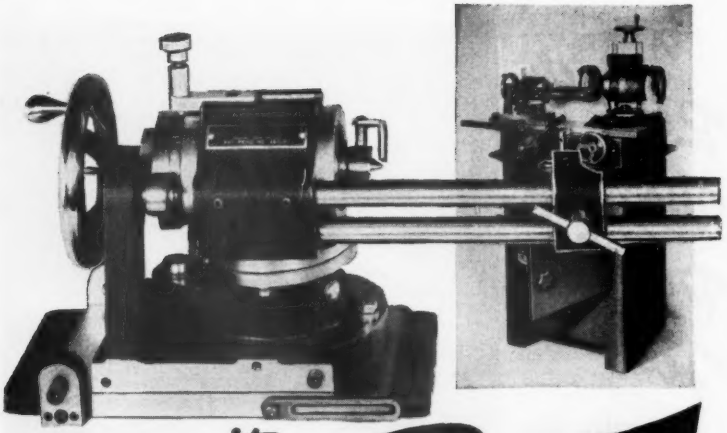

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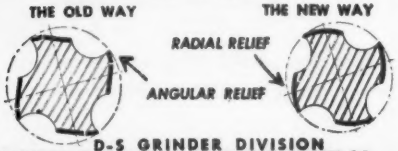
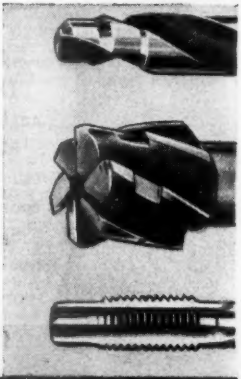
1,000's Saw For Themselves How Easy and Simple It Is To Radially Relieve Tools For Better Finish, Cooler and Faster Cutting.

With D-S you can radially relieve to a clean cutting edge almost any form that can be dressed in the wheel. Leave margin if you wish, parallel with the flute—convert twist drills into special step cutters, etc. Any good grinder hand can do this work faster than plain angular back off.



Step Drills • Taps • Reamers • Counter Bores • Profile Mills • Center Drills • Gear Tooth Rounding Cutters • Etc.



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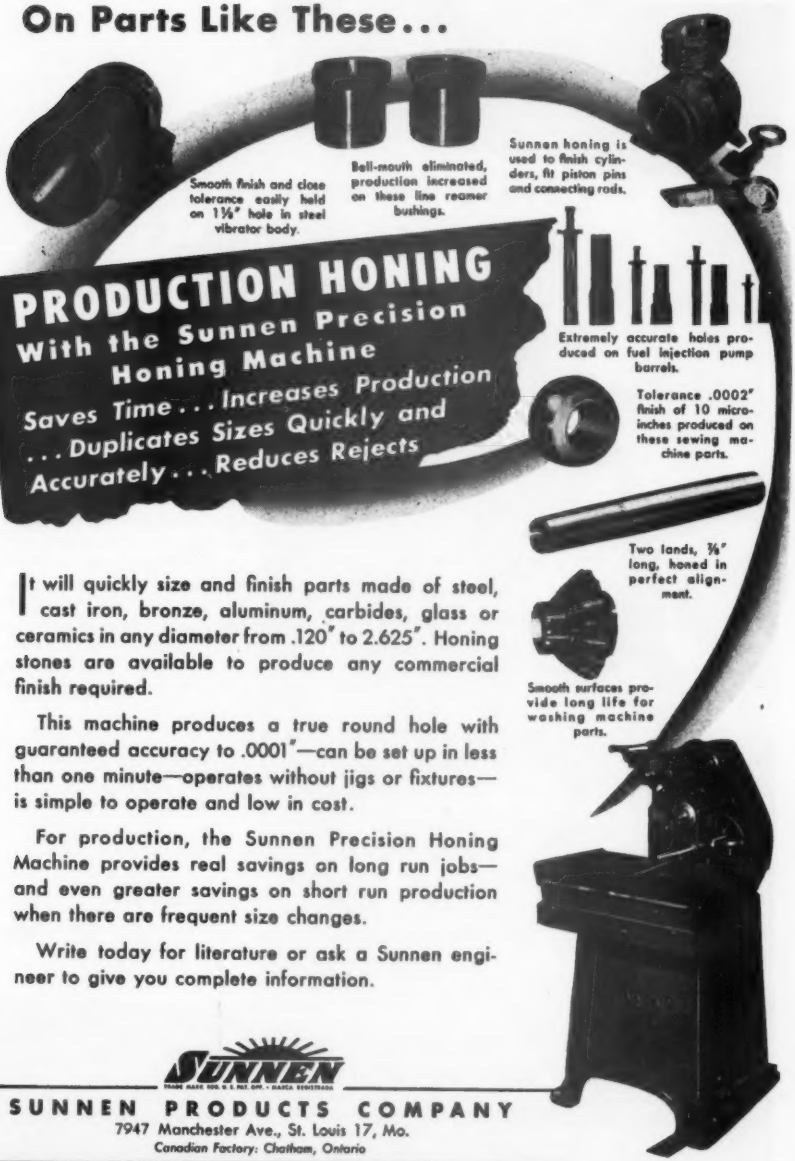
On Parts Like These...



Smooth finish and close tolerance easily held on 1⅛" hole in steel vibrator body.

Bell-mouth eliminated, production increased on these line reamer bushings.

Sunnen honing is used to finish cylinders, fit piston pins and connecting rods.

Extremely accurate holes produced on fuel injection pump barrels.

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Two lands, ⅜" long, honed in perfect alignment.

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Saves Time . . . Increases Production . . . Duplicates Sizes Quickly and Accurately . . . Reduces Rejects

It will quickly size and finish parts made of steel, cast iron, bronze, aluminum, carbides, glass or ceramics in any diameter from .120" to 2.625". Honing stones are available to produce any commercial finish required.

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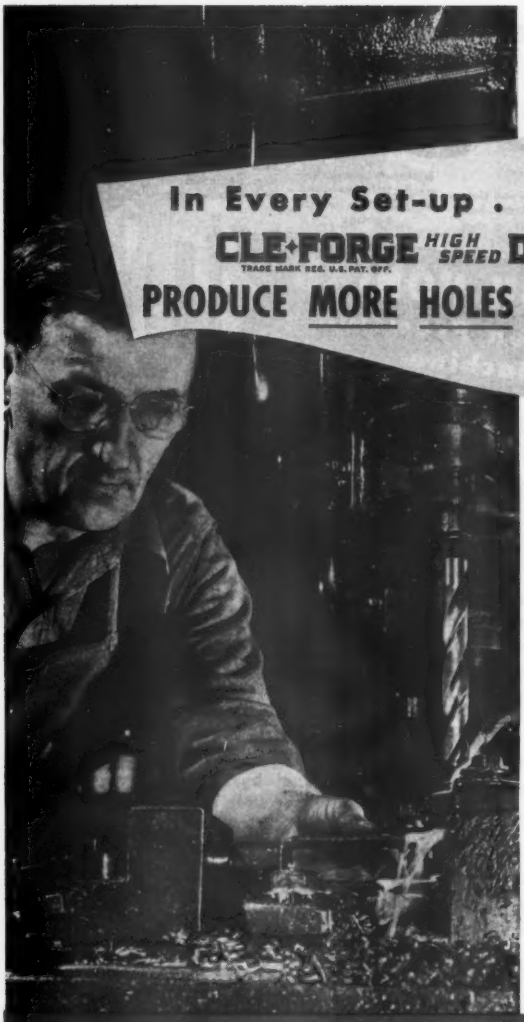

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THE JOB IN BRIEF

Operation—Mill 30 impeller blades in machined aluminum alloy blank with completely automatic feed and indexing.
Actual Cutting Time—1 minute per blade; 30 minutes per impeller.
Cutting Tools—.038" single flute cutter.
Remarks—Shape of cut determined by motorized master which drives the tracing stylus. Feed of cutter governed by special cam interlocked with indexing arrangement.

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Send us complete description with prints of your job. Our Engineering Department will send you a production estimate on the same job tooled on Gorton Tracer Controlled equipment—no obligation.

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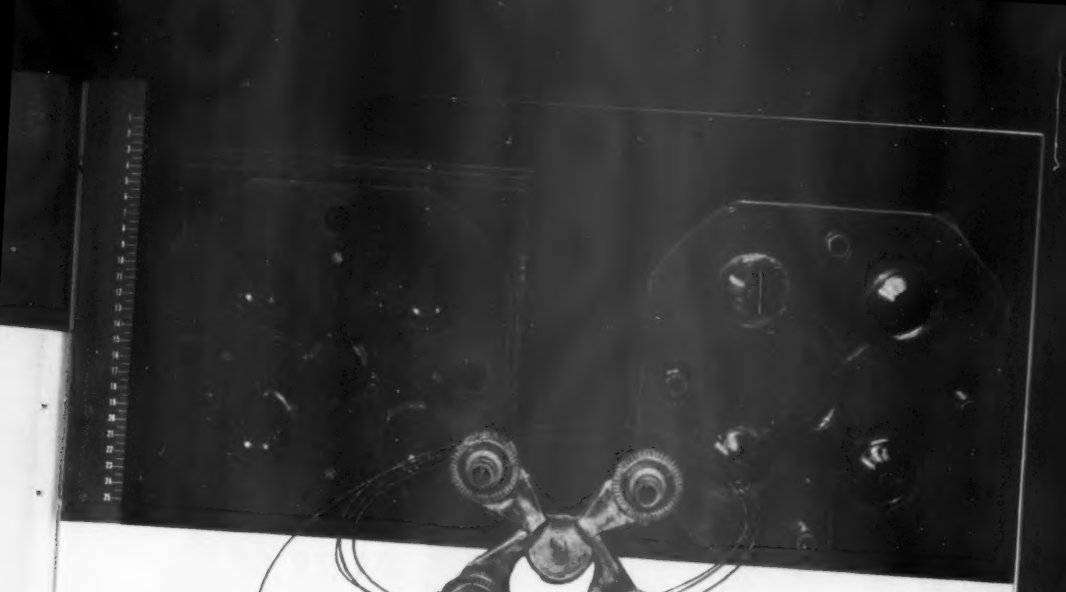

1,727,660 castings *(431,915 shots)*

at a die cost of less than 1/10 of a cent per piece!

(Die is still in service)

that's Hotform performance

on an exacting aluminum die casting job!

The above die for the production of transmission housings illustrates profitable service that typifies the special advantages of HOTFORM for light-metals die casting.

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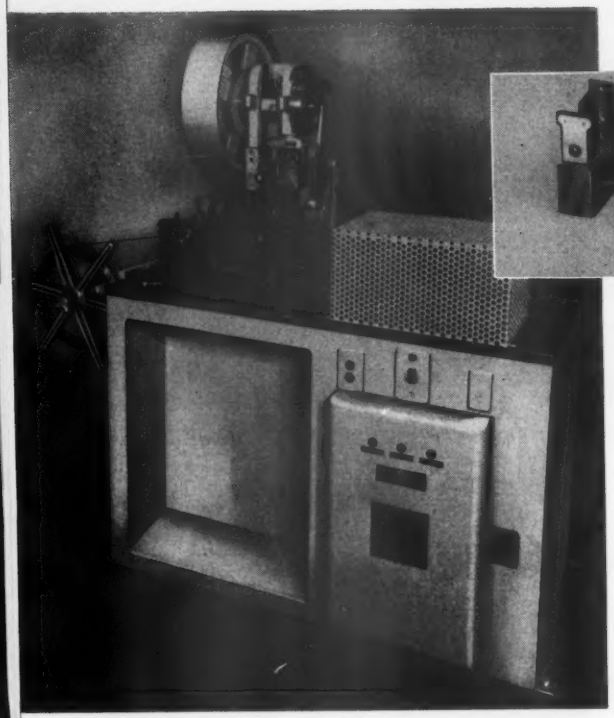

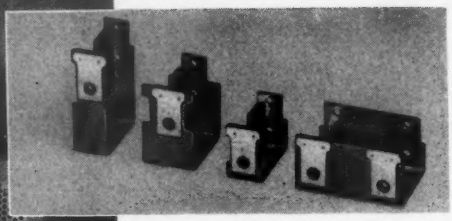

MAKER OF BUSINESS MACHINES practices what he preaches!

Barth designed and built this 1 Machine to handle 3 Operations!

IT MAKES SENSE that a company whose progress and profits depend upon applying automatic machine operation to statistic, cost and other records, should also seek means for applying automatic operation to its own production.

This Barth designed and built automatic punch press and welding machine performs three operations . . . (1) it stamps out stainless steel residuals from .003" strip stock, (2) it assembles the residuals in position on armature core yokes which are magazine fed to the machine, (3) it completes the assembly with three simultaneous spot welds, employing fully automatic electronic welding heat and timing control as well as automatic assembly ejection.

A speed of 12 to 35 completed assemblies per minute is achieved and 4 sizes of core yokes can be accommodated.

Perhaps you have a production problem on which Barth's varied experience could achieve better, faster and lower cost operation. Write for Barth's newest catalogue.

BARTH STAMPING & MACHINE WORKS, Inc.

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DESIGNERS AND BUILDERS OF DIES, TOOLS AND SPECIAL MACHINERY

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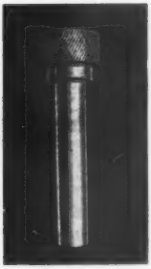

Precision-ground on special machines insuring uniform and accurate tooth shape and tool concentricity which gives maximum cutting efficiency—

USES

Developed for internal grinding, jig grinding, blending and fine finishing by off-hand grinding on hardened steels.

PERFORMANCE

Greatly improved performance as compared to abrasive wheels—faster material removal —finer finish—ability to hold hole shape and tolerances without dressing or set up adjustments—no loading, works equally well on soft materials or steel hardened to 65 Rockwell C.

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Operation in standard precision grinding equipment at conventional grinding speeds of 2000-5000 surface feet per minute is recommended.

Available in standard sizes with ¼" wide cutting face. Tool diameters 1/16" to ¾" and shank diameters ⅛" to ¼".

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30 to 50% Longer Tool Life is obtained with the JKS STA-KOOL Tool because of its internal ducts and fins which permit quantities of coolant to circulate in and around the setting. Temperature is thus kept well below the danger line, increasing diamond life. Available for practically all makes of machines.

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Rigid tests under actual production have confirmed careful laboratory tests; this entirely new milling cutter has true one-piece rigidity under severe working conditions. Yet with all parts quickly and easily interchangeable, inventory costs and machine down-time are cut to an all-time low. Cutter bodies give full support to the entire projection of the blade, not only behind but also underneath.

The same blades are used for all sizes of cutter bodies. They are furnished diamond-ground to a gage, ready for work. They are made in three types, for cutting steel, for cast iron, and for non-ferrous materials. The assembled cutter need not be placed on a cutter grinder. The blades may be re-ground individually on an ordinary wet carbide grinder. When the cutter is set up in the machine, blades may be lined up against the cut in the work.

The same locks are used for all sizes of cutters. They are in one piece and remain attached to the cutter body when changing blades.

Write for illustrated folder which gives complete data and prices.

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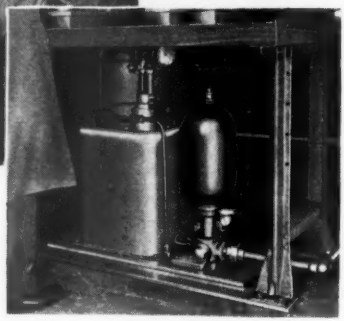
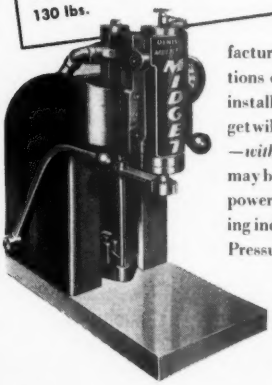
All four of these Multipress Midgets are being operated by ONE pump-unit, shown below. Up to 12 Midgets may be used with one such unit—the ultimate in low initial and operation cost!



SPECIFICATIONS (basic unit)

• Capacity (ram effort), 1 ton • Stroke, 6" • Ram speed adjustable up to 400 ipm down—600 ipm up • Daylight, 10" to 14" • Throat depth, 5" • Base Plate tooling area (optional), 10" x 10" (standard) • Dimensions, 24¾" high x 17" deep x 18¼" wide • Weight without base plate, 130 lbs.



When your manufacturing calls for successive operations on a part, multiple or "gang" installations of the Multipress Midget will give you increased production—*with low initial cost!* Up to 12 units may be used with a single, centralized power source, with each Midget having individual pressure adjustments. Pressure range is 200 to 2000 lbs.

All the production features of the famous Multipress are incorporated in the new Midget. Its Oil-smooth HydrOILic power offers you Vibratory repeat strokes, fast approach and slow pressing speeds, either dual hand lever or foot pedal safety controls—plus adjustable stroke length, ram speed and pressing effort. *Write today for Bulletin M-15.*

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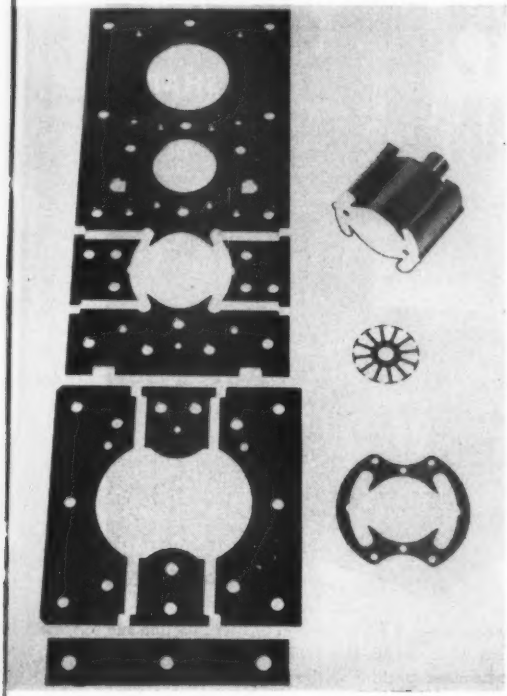
Capacity Available **NOW**

for Lamination Dies or Sections



.. Shown above are sections of an intricate Tools and Gages lamination die, spread apart so that details can be seen. During its life, this die produced many millions of pieces. Its original thickness was 1½" and it was used until thickness, when replaced, was only ⅛". Also shown is one unit of the stator punch and samples of the finished rotor and stator stampings.

Lamination dies by Tools and Gages, Incorporated, cost you less per piece produced because they're built right by the most capable craftsmen on the most modern equipment. Checking in our temperature controlled inspection laboratory assures you that every section of any die is exactly to your specifications.

Our trade reputation, financial rating and our 27 years experience building precision tooling assure you of completion and delivery of your tools and adequate financial strength to fulfill our guarantee of satisfaction.

Call us the next time you need a lamination die. Our engineers will quote you promptly and will give you dependable delivery commitments. Upon request, they will make design suggestions.

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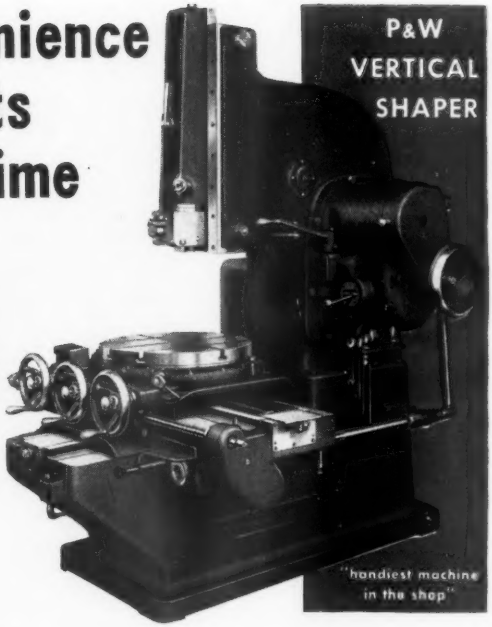
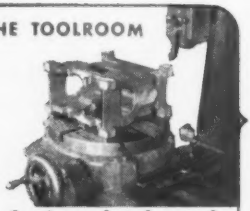


IN THE TOOLROOM

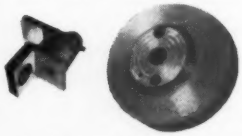


Thirty-five irregular slots and surfaces of this box jig were machined without a change in setup

IN THE DIE SHOP

Irregular contours in this die and die-shoe were machined in 8¼ hours. How long would your present equipment require?

IN THE REPAIR SHOP



(Left) All machined surfaces reached without changing setup. (Right) Special cam-former, a one-time job, produced in 3 hours.

It's a pleasure to see a P&W Vertical Shaper in action and fully realize all it can do. Hundreds of foremen agree that it is "the handiest machine in the shop."

Here in one tool are combined longitudinal, transverse and rotary table feeds with a vertical ram motion. The possibilities of this combination have proved to be almost without limit.

It's easy to strap work in place on the horizontal table . . . easy to reach all vertical surfaces without changing setups . . . easy to follow the tool's progress along layout lines as it *enters* the work. Notice that all tool pressure is *down* against the solid bed. If you are machining a die, simply adjust the ram to the relief angle you want, and cut at that angle.

Look at the jobs pictured here. Then judge for yourself how the P&W Vertical Shaper can save time on *your* work. Write today for complete literature on "the handiest machine in the shop."

PRATT & WHITNEY

Division Niles-Bement-Pond Company

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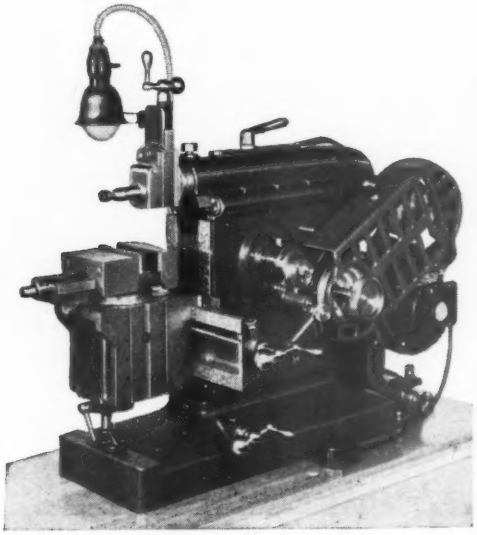
CUT PRODUCTION COSTS *with* *Low Priced* AMMCO 7" SHAPER



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AMMCO
SHAPER
saves on

1. Time
2. Labor
3. Floor Space
4. Electricity
5. Set-up Expense

The Ammco 7" Shaper is a real money saver . . . yet there isn't a big machine that surpasses it in accuracy. Compact in design, low in price, the Ammco 7" Shaper will amaze you with the variety and quality of work it turns out. Its operating expense is remarkably low. The Ammco Shaper is the perfect shaper for 7" stroke or less . . . it comes in bench or portable cabinet models. Write today for specifications and low prices.

Address Department TD-97

AMMCO TOOLS, INC.

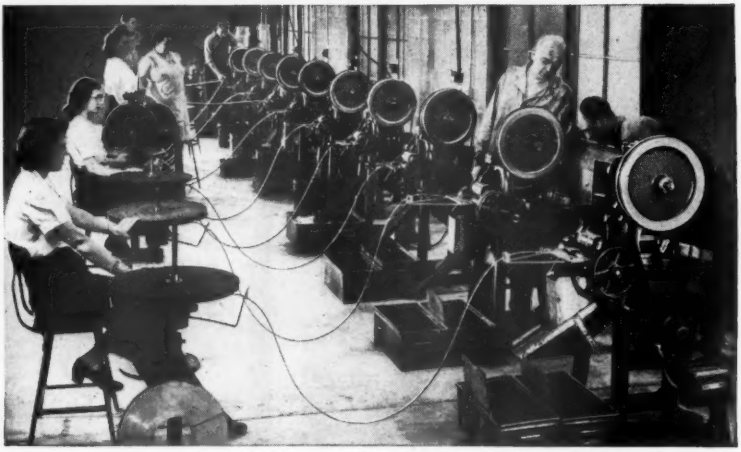
COMMONWEALTH AVENUE — AMMCO — NORTH CHICAGO ILLINOIS

SKILL IS BUILT INTO EVERY AMMCO PRODUCT

PRODUCTION PLUS!

OVER a million stampings per day with this battery of

DIEBEL 550 R.P.M. Hi-Speed AUTOMATIC PRESSES



THESE 10 PRESSES OCCUPY ONLY 12 FT. x 45 FT.

The speed of this automatic press—it's adjustable up to 550 strokes per minute!—has resulted in soaring production records over a period of years in hundreds of plants. Diebel Hi-Speed Automatic Presses, like those above, have performed wonders on steel, brass, phosphor-bronze, fiber, plastics, rubber and paper.

May we send you our illustrated circular? It's yours for the asking—an introduction to the solution of your light blanking and forming problems.

DI MACHINE CORP.
DIVISION OF DIEBEL DIE & MFG. CO.
2708 West Irving Park Road Chicago 18, Illinois

NEW SOUTH BEND 9" LATHE CATALOG

Write for it today!

PROMPT DELIVERIES from nearest distributor's stock or factory.

PRICES start at $145.00, f.o.b. factory. Average increase less than 15% over prewar price level.

TIME PAYMENTS; 25% down, twelve months to pay balance. Moderate finance charge.

SOUTH BEND LATHES also made with 10", 13", 14½", 16", and 16/24" swings. Write for information today.

The South Bend 9" Lathe is ideal for the production of small accurate parts, for toolroom work, and for use wherever accuracy is essential in the working of metal, plastics, fibre, or other machinable materials.

Catalog 9-J illustrates all South Bend 9" Lathes, lists complete specifications, and shows attachments and accessories. Mailed on request—write for copy, today!

BUILDING BETTER LATHES SINCE 1906

SOUTH BEND LATHE WORKS

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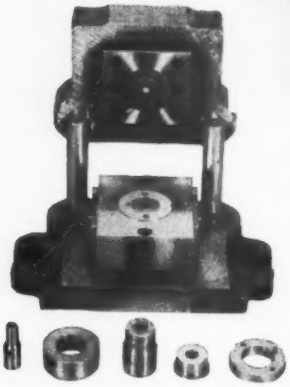
Eliminate

YOUR SPECIAL WASHER TROUBLES WITH

HOVIS

UNIVERSAL MASTER WASHER DIES



Make washers the Hovis way; save time, labor, materials. Simply invest in Hovis Master Dies to meet your requirements, then by using five small interchangeable parts, you can make new size washers, eliminating the necessity of making new dies. You can make washers on short order, saving the expense of keeping large inventories on hand.

A great many manufacturers also use the Hovis Master Washer Die as a holder for making various blanks in their own die room, eliminating the cost of new die sets.

Use This SPECIAL HOLDER →

FOR HOLDING INTERCHANGEABLE PUNCHES, COMPOUNDS AND BUTTON DIE, which can be adapted to fit the ram of any press. An inexpensive and valuable accessory. Sizes from ½" to 3". We also specialize in the manufacture of Intricate Punches and Dies.

HOVIS SCREWLOCK COMPANY

8100 E. NINE MILE ROAD — Phone: Centerline 1575

VAN DYKE, MICHIGAN — Suburb of Detroit

cut production costs with a SHOPLIFTER

- **Light, Compact**
- **Easily Moved About**
- **One-Man Operated**
- **Wide Range in Application**
- **Saves Production Time**
  in handling dies and heavy fixtures; stacking barrels, boxes, etc.; loading and unloading trucks

Specifications

Type—D
Capacity—500 lbs.
Overall height—72"
Platform lift—54" above floor level, lowers to within 5" of floor
Baseframe—24" wide x 33" long
Platform—24" x 24", steel plate
Entire frame of machine of structural steel, electrically arc welded throughout
Basewheels—4" diameter, iron wheels
Crank up and down hoist unit
Two swivel casters and two stationary wheels with push bar furnished
Painted olive green finish
Weight—250 lbs. (approx.)

Heavier capacities up to 5,000 lbs. also available. Write for details.

Prompt Delivery . . . Price $157.50. Full freight allowed

Foot Operated Floor Lock—$10.00 extra

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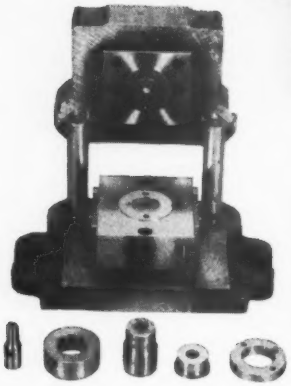
ECONOMY ENGINEERING CO.

Eliminate

YOUR SPECIAL WASHER TROUBLES WITH

HOVIS

UNIVERSAL MASTER WASHER DIES



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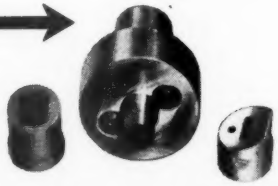

HOVIS SCREWLOCK COMPANY

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Capacity—500 lbs.
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Platform—24" x 24", steel plate
Entire frame of machine of structural steel, electrically arc welded throughout
Basewheels—4" diameter, iron wheels
Crank up and down hoist unit
Two swivel casters and two stationary wheels with push bar furnished
Painted olive green finish
Weight—250 lbs. (approx.)

Heavier capacities up to 5,000 lbs. also available. Write for details.

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Foot Operated Floor Lock—$10.00 extra

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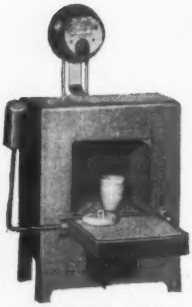
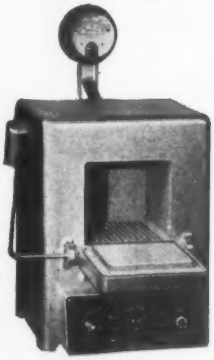
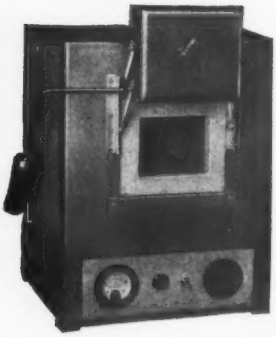
ECONOMY ENGINEERING CO.



MODEL GTP



MODEL CEA



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ELECTRIC FURNACES

With the new TEMCO stepless control you can select and hold any desired temperature.

Model GTP—interior 4" x 3¾" x 3¾". May be operated continuously up to 1500° F. and intermittently to 1850° F. Embedded heating element. Power consumption 1.2 kw. Cast aluminum body. Weight 15 pounds.
For 115V A.C.....**Price $57.50**
Also available for 230V and D.C.

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TEMCO furnaces have low initial cost and are economical to operate as nearly all the power is consumed within the heating chamber. They are fast heating and ideal for general laboratory uses, heat-treating and small unit production.

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THERMO ELECTRIC
MANUFACTURING COMPANY

FOR BROACHES

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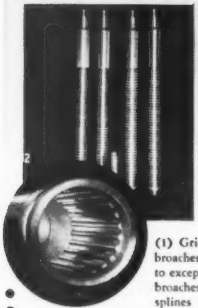
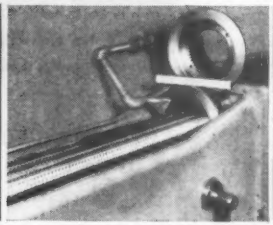
SEE *American* FIRST

You are sure of greater satisfaction when you buy broaches from *American*. This is because of *American's* broad experience in all phases of broaching—machines, tools, fixtures, and engineering. This all around experience assures you of broaching tools that will give exceptionally long life at low initial cost.

See *American* first for all types of broaches: surface, round, spline, serration, hex, square, and formed broaches in any required size. *American* also manufactures pull and push heads for broaching tools of all sizes. And see *American* first for *everything* in broaching—machines, tools, fixtures, and engineering.





(1) Grinding a spline broach. All *American* broaches are ground by skilled broach makers to exceptionally close tolerances. (2) These four broaches, used in succession, cut 24 angular splines in steel airplane landing gear struts. Broaches are 65" long, and cut a spline section 12⅛" long by 4¼" I.D. Inset shows broached interior of part. *American* manufactures broaches of every size and variety, for the metal working industries. (3) This large broach, in a standard *American* H-30-72 Horizontal Broaching Machine, cuts 46 involute spline teeth in a bevel gear part. Size of broach is indicated by 12" rule shown with broached gear part placed on top of machine (4) Checking a spline broach for spline width in *American's* Broach Inspection Department. Every broach must pass rigid inspection before shipment.

WRITE FOR CATALOG NO. 144

Contains complete description of different types of broaches and machines. Tells uses of each. Gives information on care and maintenance of broaches, specifications of standard broaches, and other useful facts. No obligation. Write for your copy today!

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BROACHING MACHINES
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GAGE BLOCK INSPECTION SERVICE

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84 BLOCK SET

(Other sets proportionately low)

DON'T LET DOUBT CAUSE CONTROVERSY
. . . IT COSTS SO LITTLE TO BE SURE!

Webber opens its inspection facilities to all users of gage blocks regardless of make. The wear inflicted through daily use over a period of months is sufficiently great to warrant careful examination at periodic intervals. The absence of this precaution can cause controversy and production difficulties. Avoid trouble, send those gage blocks to Webber, now.

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Certificate of Inspection

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Jones Tool Company

Anywhere, U.S.A.

Made of Set Webber

Set No. 16-B

Serial No. 1234

Checked by C.O.M.

Results Blocks passed (✓)

recommended for replacement

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YOUR CERTIFICATE OF ACCURACY

1. ***We will return the gage blocks with a Certificate of Inspection showing present size in comparison with master blocks CERTIFIED by the U. S. Bureau of Standards.***
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WEBBER MAKES PRECISION GAGE BLOCKS EXCLUSIVELY

- ★ Gage Block Sets in Steps of .00005"
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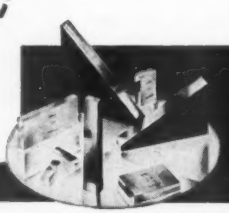
- ★ Carblox (Carbide) Wear Gages.



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FAST – and flexible, too!

NO. 11 LEACH
SURFACE GRINDER

For smooth performance . . . for flexibility . . . for fast, accurate production, the rugged No. 11 Leach Surface Grinder is unequalled – anywhere!

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EXTRA LARGE CAPACITY
6" x 24" x 12"
HEIGHT 52" WEIGHT 850 lbs.
2 SPINDLE SPEEDS
2600 and 3500 R. P. M.

$650.00

Complete with motor of standard current characteristics F.O.B. Factory

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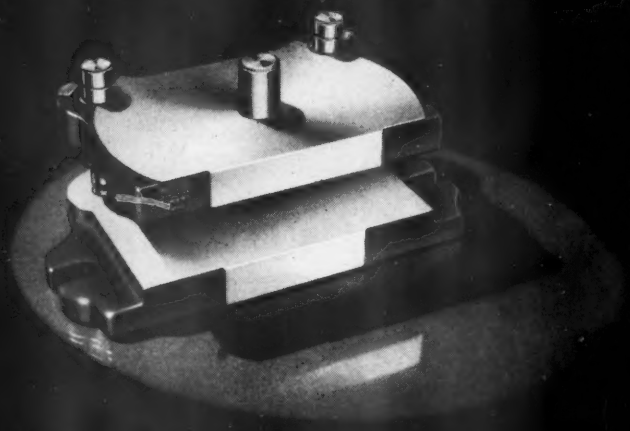

Our constant endeavor to deliver a better product is the basis of our ever-increasing volume of business. We invite your inquiries regarding all-steel and semi-steel, standard and special die sets; dowel pins, cap screws, die springs and other accessories.

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PRECISION DRILL JIG BUSHINGS

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Stock of popular sizes carried at these locations.

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LOS ANGELES, CALIF. Walter W. Miller PRospect 2687	*DAYTON, OHIO Geo. D. Laughter Co. KEnmore 4191	MINNEAPOLIS 2, MINN. Chas. W. Stone Co Geneva 8631
PHILADELPHIA, PA. Albert R. Dorn DElaware 6-3553	DETROIT, MICH Diemaker Supplies Co. TRinity 1-2865	ROCHESTER, N. Y. Fink Tool Co. Monroe 5679
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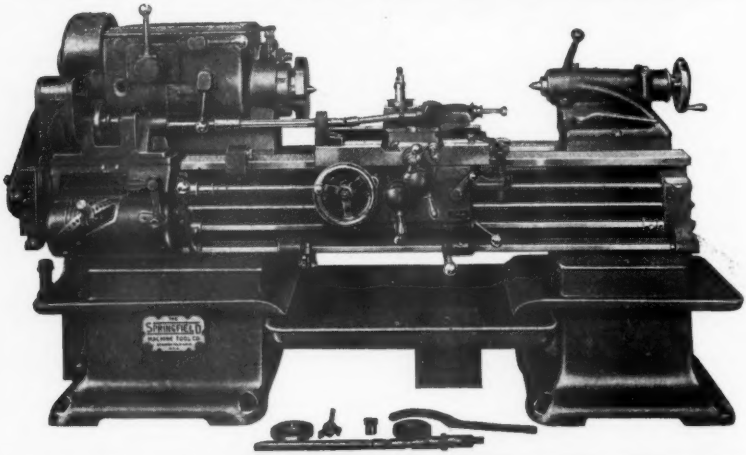
"A Master Lathe for Master Craftsmen"

The Springfield Precision Tool Room Lathe is engineered and constructed to the most exacting requirements. Its superior design features have been developed through more than sixty years' experience in building precision machine tools.

The powerful Headstock provides twelve spindle speeds. No more than seven of its chrome Molybdenum hardened *ground* gears are in mesh at one time. Timken Precision Taper Roller Bearings in solid headstock housings insure permanency of spindle alignment and long life. All bearings and gears are spray lubricated by cooled oil from the large reservoir in the leg.

The semi-steel Apron is of extra-heavy, box construction and is completely ball and bronze bearing-equipped. The Taper Attachment is capable of very fine, micrometer screw adjustment. The sturdy Compound Rest is a heavy duty, square base type providing full 360° swivel. The Tailstock, massively designed, has large centers and exceptionally long spindle travel.

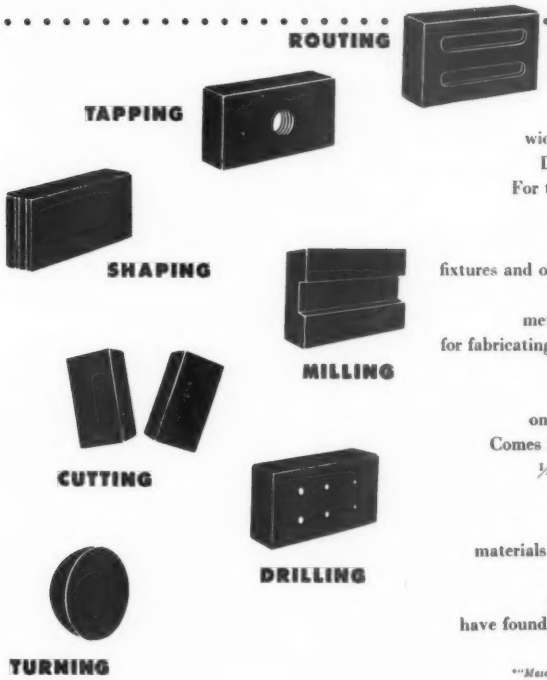
ASK US FOR *YOUR* COPY OF BULLETIN 162 which illustrates and describes the features of the Springfield Precision Tool Room Lathe and gives detailed specifications.



THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD ▪ OHIO, U. S. A.

NOW IS THE TIME FOR YOU TO TRY



In these days of long delivery, wide-awake plants are using Masonite* Die Stock in their tooling operations. For this durable, time-proved material is available for immediate delivery.

You can quickly produce dies, jigs, fixtures and other tools with Masonite Die Stock.. It machines easily with wood- or metal-working tools. You'll find it ideal for fabricating sheet metals—especially aluminum, copper and brass. It won't check, split, shrink or twist. Weighs only one-sixth as much as steel or cast iron. Comes in panels 48x72 and 48x144 inches—¼ to 2 inches thick. Easily laminated to greater thickness.

Don't let the scarcity of certain materials halt your production. Try Masonite Die Stock. Besides its great merit on production runs, many industries have found it valuable for experimental tooling, mock-ups and models.

*"Masonite" is a trade-mark registered in the U. S. Pat. Off., and signifies that Masonite Corporation is the source of the product.

WITH

DIE STOCK

ANOTHER MASONITE BRAND PRODUCT

MAIL THIS COUPON **TODAY** FOR COMPLETE DETAILS!

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Please send me a free copy of your illustrated, information-packed "Masonite Die Stock Data Book."

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ELMIRA, N.Y.

High Speed Precision *Universal* Milling Machine

for Profitable Tool Room and Laboratory Milling

Analysis of investment and time costs will prove that large milling machines are too expensive and slow for most tool room and laboratory milling operations.

Hardinge Model UM High Speed Precision Universal Milling Machines are designed to meet the definite need of tool room and laboratory for precision, ruggedness, extreme accuracy and ease of operation.

Specifications

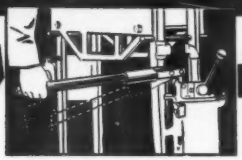
1" through collet capacity for both cutter and dividing head spindles; 11½" longitudinal, 13¼" vertical, 5½" transverse travel; power feed for table ⅛" to 13" per minute; 7" swing universal spiral dividing head; spiral leads from .600" to 42.656"; eight speeds from 110 to 1850 r.p.m.

Also available in TM Model with non-swiveling table and Universal Plain Dividing Head.

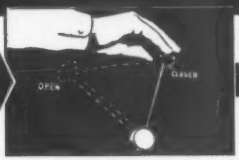
HARDINGE BROTHERS, INC., ELMIRA, N. Y.

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

These KRW Hydraulic Arbor Press Features...

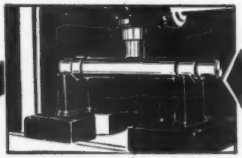


Fast Action, cylinder is filled as ram travels to work. You get tons of pressure with first pump stroke.

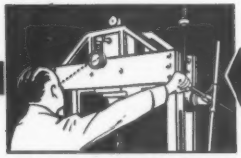


Finger Tip Control opens and closes valve in a jiffy. No gripping effort assures easier, faster operation.

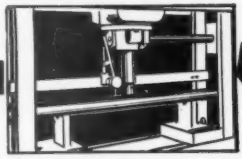
KRW Built-in Mechanical Press permits up to 3 tons pressure for straightening small diameter work.



One Piece, All Steel V-Blocks have machined surfaces for greater accuracy; usable upright or inverted.

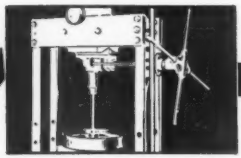


Highly Visible Pressure Gauges are mounted where they can be quickly checked. Read in tons and pounds.

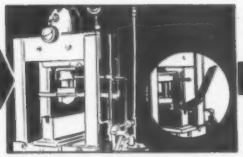


Micrometer Dial Attachment permits great accuracy in checking work without removing from V-block.

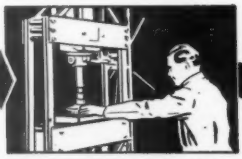
Reduce Costs ON THESE AND OTHER DAILY Production Jobs...



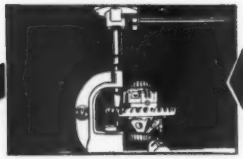
Broaching a key way in a flywheel. 7½ inch ram travel makes many broaching jobs practical on KRW Presses.



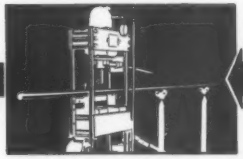
Bending in production lots with simple, inexpensive dies is easily done on low-cost KRW Hand-operated Presses.



Pressing of all types is efficiently handled. Adjustable bed makes pressing on long shafts a very simple operation.



Riveting with KRW Riveting Attachment is simplicity itself. Many KRW Presses are used for this type work.



Straightening, especially on long work, is easy on a KRW Press because of its special open-end construction.

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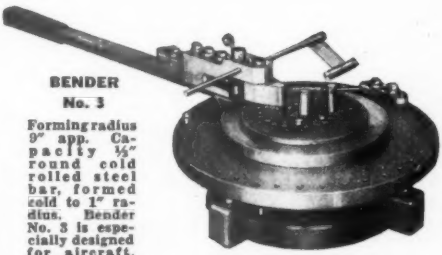

BENDER No. 3

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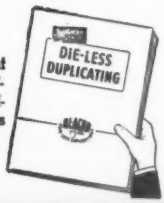

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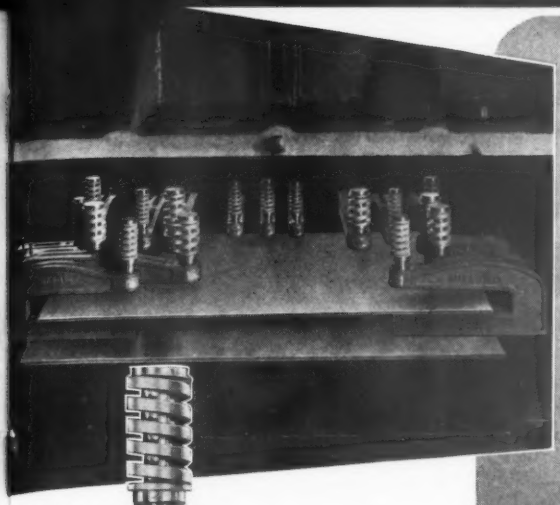

Above—illustrating mounting plate setup of Wales Type "CJ" Hole Punching units ready to punch the ¼" thick work in position

Showing a typical Wales Type "CJ" Hole Punching Unit with ½" angle nested to be punched. Note the high die which provides unobstructed slug clearance and permits close punching to leg of angles.

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WALES Type "CJ" UNITS

for punching mild steel

up to **1/4" THICK**

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Faster setups, almost complete elimination of press "down time", and easier storing of combined templates and mounting plates without Wales Units are NEW money-saving and time-saving advantages that cannot be overlooked in today's high cost of production.

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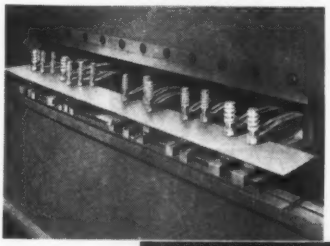
**Note: Wales-Strippit Corporation has not granted permission to anyone to use this patented mounting method except with Wales Hole Punching and Notching Equipment.*

WALES TYPE "CJ" HOLE PUNCHING UNITS USED ON T-SLOTTED PLATES IN STAMPING PRESSES AND ON BED RAILS IN PRESS BRAKES



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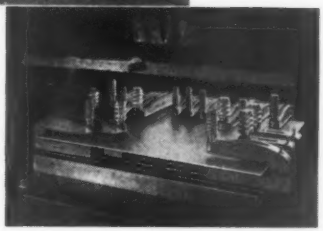
Showing a set-up Wales Type "CJ" Units in press brake for punching staggered holes. Note the ¼" thick work in position in the Units.



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Showing Wales Type "CJ" Hole Punching Units mounted on a T-slotted plate in a stamping press with work ready to be punched.

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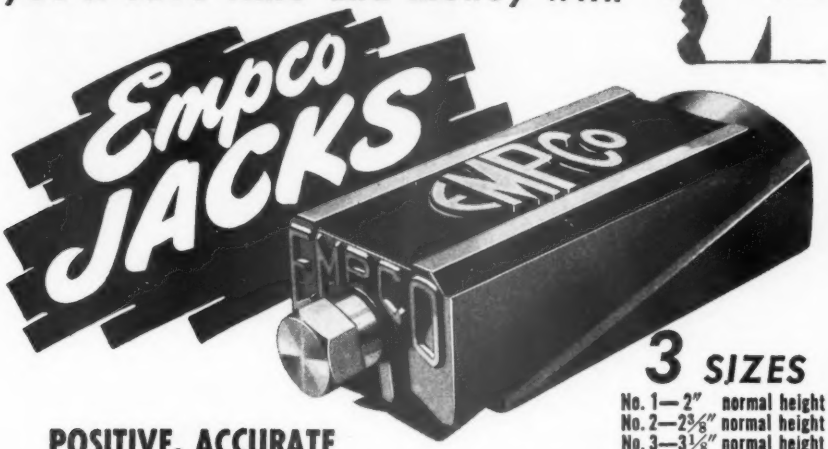

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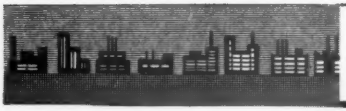
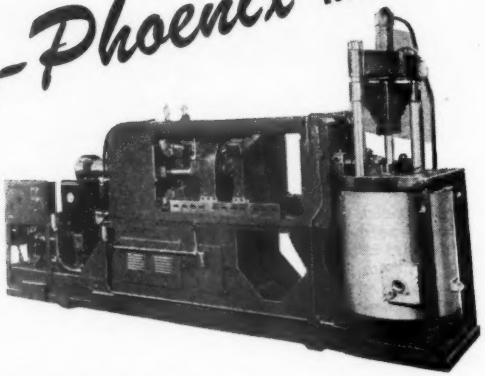


37.2% OF METAL WORKING PLANTS USE DIE CASTINGS*

11% OF METAL WORKING PLANTS ARE CONSIDERING THE USE OF DIE CASTINGS*

A *Lester-Phoenix* MESSAGE



FOR USERS OF DIE CASTINGS— and THOSE PLANNING TO USE THEM

- This husky machine, the new LESTER HP-2-SF is equipped to diecast zinc, tin or lead. A few hours work, using stock parts, will prepare it for casting aluminum, brass, bronze or magnesium by either cold chamber or pre-fill system.
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** From the 1947 diecasting survey made by* **STEEL** *magazine.*

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The immediate future holds for American Industry an opportunity to rise above all past levels of performance, profit-wise and social significance-wise. Profit-wise for Industry's millions of wage earners, and social significance-wise by America's ability to demonstrate, conclusively, to peoples of other social and economic philosophies the superiority of the American way of living and working.

The accelerating decline in American exports is due to the termination of abnormal war-conducting expenditures abroad and the approaching depletion of the dollars we've provided by postwar loans.

American Industry cannot afford to wait for the formulation and execution of a foreign loan policy broad enough to prevent this continued dwindling of our exports.

Furthermore, there is no promise or hope that it will be prevented by increased exports of customer-nations.

Other than by international leaf-raking and boondoggling, the only way other nations can pay us dollars for things is to sell us things for dollars. It's as simple as the control of traffic in a congested city. For each and every *ONE WAY STREET* there must be a corresponding *other way* street of equal capacity to prevent the decline and stagnation of a neighborhood.

We therefore cannot expect an increased volume of exports to offset the blow to our economy that is looming on the horizon due to declining per capita real income, threatened reduction in construction volume, wages disproportionate to a lessened individual producton efficiency, expansion of consumer credit and decreased savings.

It is now American Industry's responsibility to demonstrate that all it stands for can insure and perpetuate the economic well-being of this country. Through increased production efficiencies, decreased costs, expanded domestic markets, new materials and new uses for old materials, new machines, new tooling, and new skills and know-how, today's luxuries can be made tomorrow's necessities.

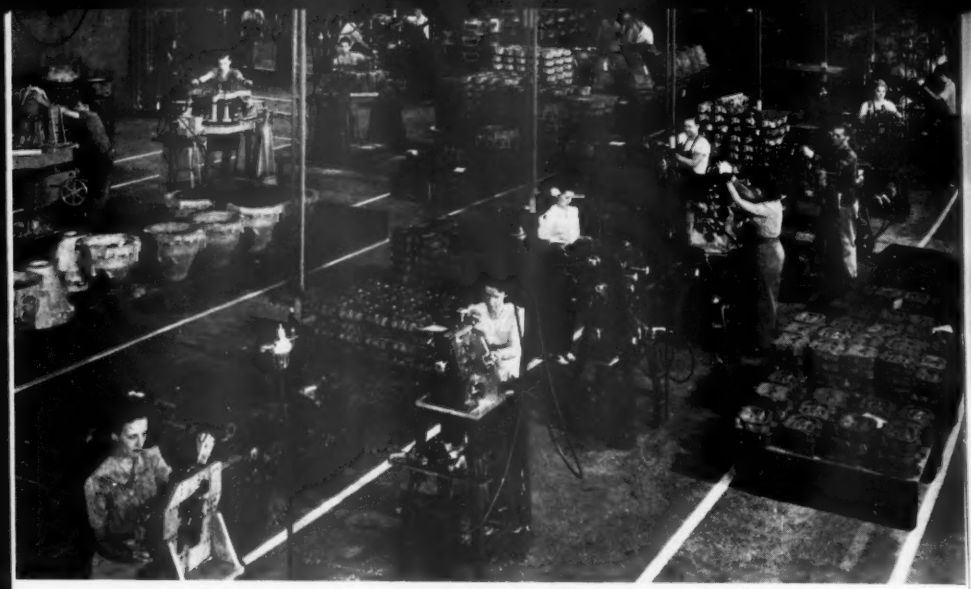
The social significance of this responsibility greatly transcends the mere "making of money." Paradoxically, however, due to our American way of doing, the discharge of this responsibility will result in the making of money; by wage earners, by buyers and sellers, by distributors and consumers.

American Industry by its bigness, its capacity to produce and consume, its capacity to employ, its enterprise and know-how, can maintain us on such a high economic plane that other nations wll raise their own standards of living simply by endeavoring to catch up with us.

Every new machine, every new tooling project, every new apprentice program and every new plant, one and all, are evidence of Industry's recognition and acceptance of its responsibility.

E. Willard Pennington

editor



Fixtures For Casting Qualification

Part I—The Case For Casting Qualification

The most important operation in machining a part which originates as a casting is the initial setup for the first operations on the machine line. On these first operations depend in great measure the final accuracy and quality of the finished part.

With properly designed fixtures an experienced operator can be expected to make the first setup by manipulation and adjustment, but in the more complicated castings this becomes increasingly difficult as the number of operations to be later performed is multiplied. And, if any of the surfaces to be later machined are not in proper mutual relationship due to this manual adjustment, the error will not be determined until such time as the part has been run through successive machining operations to the point of being found to be scrap or rework.

If a means can be devised for positively locating such a part at the beginning of machining operations, then only ordinary ability to operate the machine would be the prime requirement of the worker. The technique and procedure of *Casting Qualification* solves this problem by placing accurately located rest spots and dowel holes on the rough castings.

by A. H. Blacker
Cleveland, Ohio

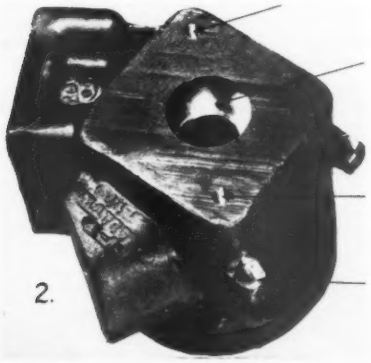
This is done by the use of a *Qualify-*

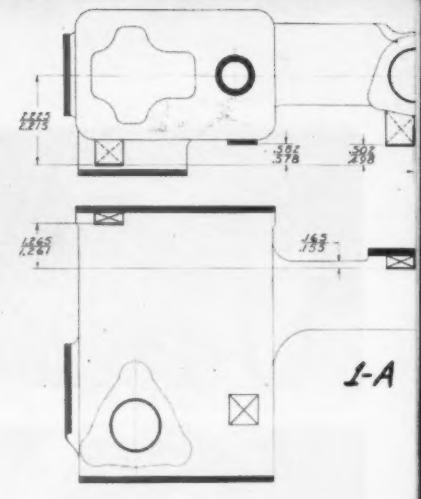
ing Fixture, designed to incorporate targets and bushings to represent the basic dimensions of the finished piece, exclusive of working tolerances. These "targets" can be so designed as to establish the proper relation of the profiles, bosses and planes both to each other and to the rest spots and dowel holes established in this fixture. The tolerances to which a qualifying fixture is built are comparable to gage maker's tolerances, hence it is not only within basic dimensions plus foundry tolerances, but well within basic plus production tolerances as well.

Rough castings may be laid out via the surface plate and height gage before any cut is taken, or one skin cut may be taken in order that the casting may rest positively on the surface plate. Then the layout is made with a height gage, with the result that the first skin cut may have to be corrected in order to prevent "machining air" somewhere about the casting.

In the qualifying fixture the casting can be easily oriented by means of the bushings and sighting (or target) plugs so that its final absolute position in the qualifying fixture is the one which suits or represents the best average or compromise position for all bosses and machine cuts.

Fig. 2. A casting after qualification showing both the use of dowel holes and of machined flats for location. The dowel holes are later utilized (after enlargement) as parts of the specified hole pattern of the finished part.





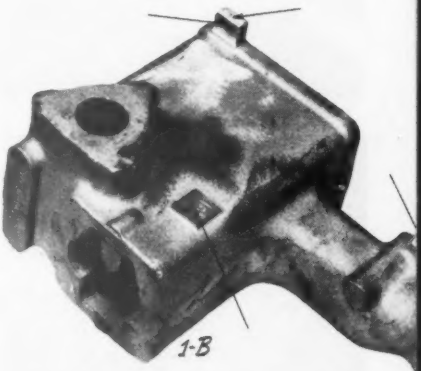
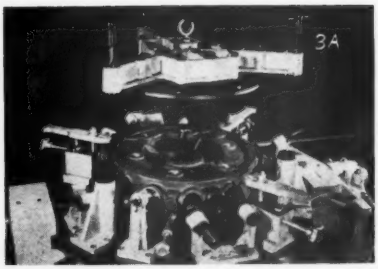
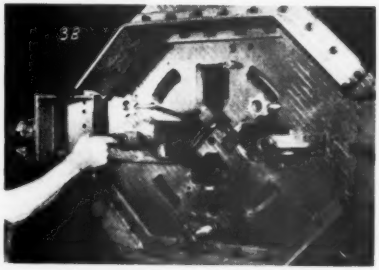
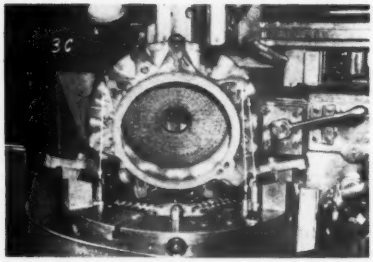


Fig. 1. (A) Typical Casting Qualifying drawing showing the tolerances of ± .005" from the targeted areas to the qualified surfaces, and of ± .002" between qualified surfaces. (B) The same casting after the qualifying operations have been performed. These four machined surfaces will be used to locate the casting in the machine line to insure that sufficient machining stock will be found at the hole locations and the correct distance between the neck wall and the machined flat will remain after milling.







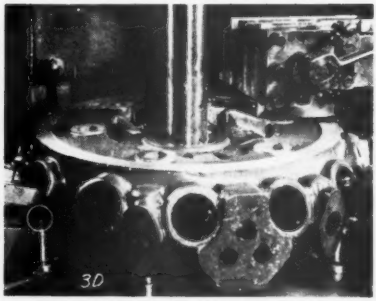


Fig. 3. (A) View of the casting as placed in the Qualifying Fixture, showing the targeting templates, the hole locating plugs, and the hand screw pins for the equalization adjustment of these points. The upper half of the fixture is about to be lowered into position. (B) A qualifying dowel hole being drilled with an air drill. (C) The casting as installed in a vertical turret lathe fixture, using the qualifying spots for location. (D) Machining the casting from locations established by the qualifying operation. (See Example A).

Qualifying fixtures are used to perform two functions. One is to check foundry casting equipment by checking a first "green" casting. Since the casting must be correct dimensionally in order to machine correctly over-all, the control of the foundry product must be continuously and carefully checked. This can be achieved by checking sample castings in the qualifying fixture directly from the foundry production line, or, in the case of castings purchased from a vendor, such checking can be the most efficient method of approving such castings for acceptance.

When qualifying checking can be done at the foundry, it can lead to a higher degree of foundry efficiency, since, not only does qualifying furnish a standard for finished foundry production, but it can be used as a warning against faulty foundry equipment before production in the foundry line has reached an appreciable volume. Since all targets on the qualifying fixture show profiles and critical areas within given tolerances, any core shifts, errors in pattern dimensions, etc., will be immediately revealed if the first green casting each day from all equipment is checked in the fixture.

No "qualifying" machining is done on this casting, and if it checks it is returned to the foundry production line for continued processing. If the qualifying fixture indicates faulty foundry practice or defective casting equipment, then steps can be taken to immediately bring the process under control. In addition, the cost of the defective casting can be more readily charged back to the vendor if dimensional errors are discovered before any machining operations are performed.

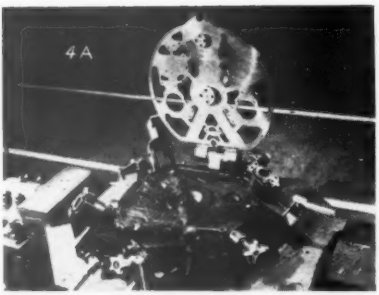
By qualifying castings directly upon

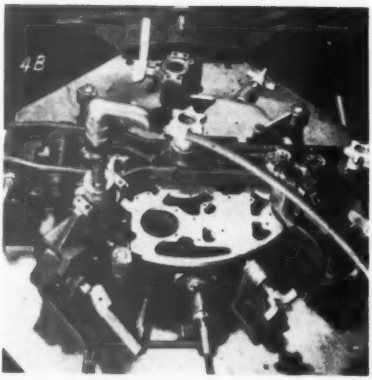
receipt from the foundry, dimensional errors are revealed before the casting enters the machining process, thus saving machining costs which might have accumulated before the dimensional defects were otherwise discovered.

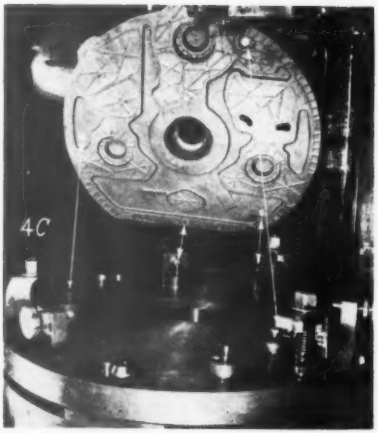
The other function of the qualifying fixture is to establish locating spots on the casting which will insure proper location of the casting on the machine line during all subsequent machining operations. If the casting is correctly targeted in the qualifying fixture, sufficient stock for machining is guaranteed.

Locating points are then machined with hand tools, air or electric, while the casting is in this correctly targeted position. Then when the locating buttons or stops in the machine line are set to the same relative dimensions as the locating points machined in the qualifying fixture, the casting will be in the same correct position in the line as it was in the fixture.

Consequently, all profiles, bosses and planes will be in proper mutual relation as specified on the finished part drawing. Machining is then performed without manipulation or adjustment of the







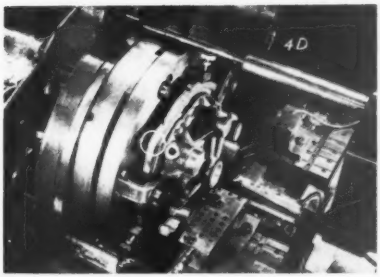
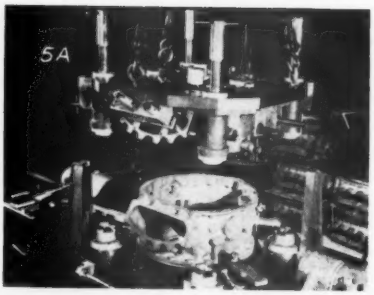
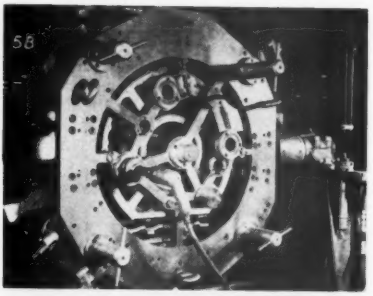
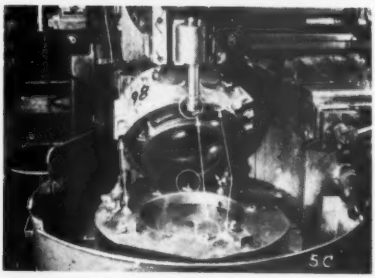


Fig. 4. (A) The casting in the Qualifying Fixture with the targeting plate about to be brought down into position. (B) The casting as qualified or equalized in the fixture and machined. Note how the areas requiring later machining have been visually located in relation to the target plate. (C) The casting as installed in a vertical turret lathe fixture, showing the incorporation of the qualified spots as locating points in this fixture, both by rest spots for vertical height and by dowel holes for radial location. (D) A facing and boring operation in a Foster automatic turret lathe, using the same locating points. (See Example C.)







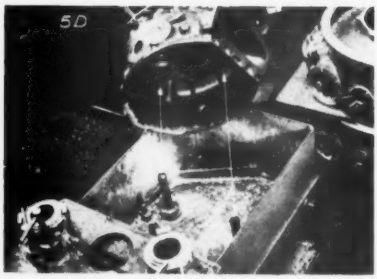


Fig. 5. (A) The casting about to be located in the Qualifying Fixture. Note how the requirements of qualification on top, bottom, and side surfaces of the casting are met by the use of the box type fixture enclosing the casting. (B) Drilling a qualifying hole in the bottom surface of the casting. Note how the target plate has been utilized to bring the holes to be later drilled as close as possible to the center of the bosses. (C) The casting about to be machined, locating from dowel holes and rest points on the opposite face. (D) A radial drilling operation using the same type of location from the back face of the casting. (See Example B).

casting in the line. This, briefly, is the principle behind Casting Qualification.

As a further result of checking foundry equipment, checking production castings, and furnishing castings to the machine line with positive locating points, the machined casting which reaches the assembly line is accurate at all points, thus facilitating assembly operations to the highest degree. An interesting additional advantage appears which will be noted in the accompanying examples, in that the total machine time is lowered by as much as fifteen percent in some cases.

The illustration appearing at the heading of this article shows the Casting Qualifying Area as established in the war time plant of the Wright Aeronautical Corp., Cincinnati, Ohio. Figure 1-A shows a typical Casting Qualifying Drawing, while Figure 1-B shows the operation as completed on this casting (note the tolerances of ±.002" between finished or qualified surfaces and ±.005" from the targeted areas to the qualified surfaces). Figure 2 shows another casting in which both dowel holes and rest spots were machined in the qualifying operation. Figures 3, 4 and 5 show both the qualifying operations and the subsequent machining operations on the castings from which the examples below have been taken.

It can be seen from the accompanying examples that fewer faulty castings were rejected at the layout table than at the qualifying fixture. Of those castings passing layout, more were eventually rejected in the machine line than of those passing qualification. On many parts the time for layout is a little less than that for qualifying; but a

(CONTINED ON PAGE 81)

Streamlined Handling Of Dies And Stampings

Press room procedures have had to be streamlined to the point where manual handling of dies and materials is reduced to an absolute minimum in order to keep pace with the increased production rates which are necessary in order to lower prices so that more goods may be sold.

This streamlining results in a reduction in floor space charges, reduction in sheet stock transportation time from storage to the presses, reduction in handling time from floor to press table, and increased press output due to a more continuous operation.

A survey of a typical metal-working plant was made by the Rack Engineering Company which disclosed that an area of 40 square feet was required for storing strips on a stationary feed table or on the floor beside the press. A press operator and a stock helper spent 60 minutes each day, or 20 hours per month, carrying strips from the stock bin to the floor at the rear of the feed table.

It required eight seconds for the press operator to pick up three six foot strips from the floor and load them on the feed table. Based on a 100,000 piece order of 140 pieces per strip, a total of 238 pickups was required for transporting strips from the floor to the table. This phase of the operation took 31.7 minutes or .53 hours per order.

Processing 100,000 strips at the rate of 2000 per hour required 50 hours, or three full working days (two shifts). Based on a twenty day work month, a total of 3.55 hours was required each month for the handling of the strips from the floor to the table.

The surveying engineers recommended the installation of ten Rack Hydraulic Feed Table Conveyors to handle five presses. This would provide one table for each press while the remaining five were being loaded. The capacity of each table is rated at 2000 pounds, yet it only occupies nine square feet of the 40 square feet at each press. Therefore strips can be loaded at the storage bins, moved directly to the press, raised or lowered to die set level, and fed directly into the press, thus eliminating the carrying of the strip from the storage bins by two men (20 hours per month), placing them on the floor and then picking them up again by the press operator (3.55 hours per month).

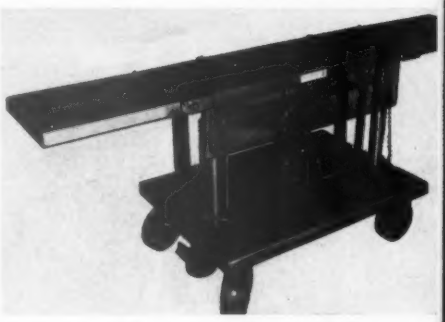


Fig. 1. A newly developed feed table by Rack Engineering Company is made in sizes ranging from one to five tons, capable of handling sheets from three to ten feet in length. The foot-operated hydraulic operated mechanism permits the operator to raise or lower the table to precise levels and to control the angle of the table top through its range of 40 degrees.

The elimination of these two items of handling time amounts to 23.55 hours for each press and affords a production increase of 7.5% per press.

The cost of ten Hydraulic Feed Table Conveyors at $245 each represents a total outlay of $2,450. To justify such an expenditure the resultant savings were summarized as follows: At $6 per square foot, the reduction of 155 square feet of floor space surrounding the five presses represents an immediate saving of $930.

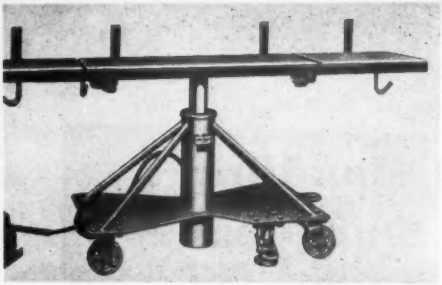


Fig. 2. Hydraulic elevating table designed by Lyon-Raymond Corporation to accommodate bundles of stock loaded by overhead hoists or fork trucks.

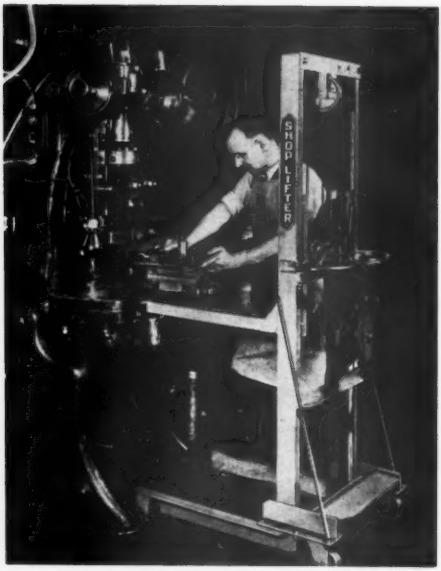


Fig. 3. Manually operated Shoplifter built by Economy Engineering Co. Dies weighing up to 500 pounds are easily handled in and out of presses by one man.

This deducted from the recommended expenditure of $2,450 leaves a balance of $1,520.

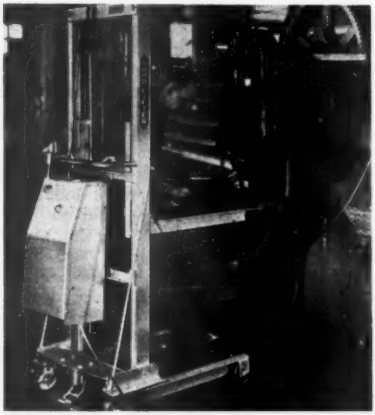
On the basis of $1.10 per hour with 200% added for overhead burden, the accumulated time reduction of 117.75 hours per month amounts to $388.58 monthly or a liquidation of the balance of $1,520 in 3.9 months.

An interesting application of the portable stock table is the case of a manufacturer who has equipped his plant with Lyon-Raymond hydraulic elevating tables. In this plant metal strip stock is cut to length, rolled to precision tolerance, and then formed on power presses. The transporting of the strip stock has been mechanized so that the stock is loaded on a portable table at the stock room and moved to the shear. It is fed directly into the shear from the portable table and after cutting to length, passes directly onto another portable table. This loaded table is moved to the rolling mill and the stock fed from the table into the rolls and then caught at the other side of the rolling mill at the finish of the rolling operation on another table, which is transported to the power presses and the rolled stock is fed from the table through the dies.

This hydraulic elevating table, Figure 2, is designed to accommodate bundles of stock, loaded by means of overhead hoists or fork trucks. Its elevating feature will enable a machine operator to keep stock at the desired height for feeding into dies, shears or rolls and will eliminate awkward manual handling and the bending of stock. A valuable feature of portable feeding tables is that stock is easily moved from one ma-

(CONTINUED ON PAGE 119)

Fig. 4. Economy's Electric Shoplifter shown leveled to punch press height and die being placed in press.



Hydraulic Pumps And Power Units

Part I

Editor's Note: Herewith our fourth feature presentation of hydraulic know-how from the Machine Design Conference on Hydraulics sponsored by the Cleveland Engineering Society. For the first, "Hydraulic Valves and Control Devices," see TOOL & DIE JOURNAL, November 1946 and January 1947; the second, "Hydraulic Applications From the Users' Viewpoint," TDJ, February 1947; the third, "Hydraulic Circuits and Applications," TDJ, March and April 1947.

by Arthur B. Riddiford, Jr.
John S. Barnes Corporation
Rockford, Ill.

Before a group of engineers, it is unnecessary to define in detail the word "hydraulics". We know it means the use of liquids in motion and under pressure for some practical purpose. We use it to help us do our daily work better and more cheaply.

The general use of the word suggests to us the Egyptians at the peak of their civilization, some 4,000 years before Christ, floating their boats down the current of the Nile to deliver goods to cities near the river's mouth. Then, after cargoes were discharged, they would use the power of the prevailing winds to sail back upstream for another load. This is truly an elemental and practical use of fluid power.

Hydraulic Structures

As engineers, we are interested in "Oil Hydraulics". There are no prevailing winds or currents of oil in nature which we can readily use in our machines; so we must produce them ourselves. This we can do with pumps of various kinds. A pump is a means of producing a flow of oil under pressure. Instead of the Nile, we must use pipes. Instead of boats or sails, we must have cylinders and fluid motors to convert the flow and pressure to our use.

It is interesting to review some of the high spots in the history of the development of these hydraulic elements.

In the year 150 B. C., we find Hero of Alexandria experimenting with an impulse wheel. Although using steam to produce motion, the action is the same as is used to drive the output shaft in present-day torque converters. The converters use oil and serve as trans-

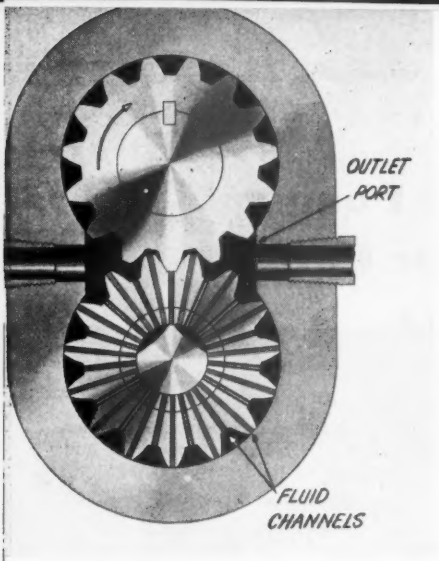


Fig. 1. The construction of a gear pump wherein the flow of oil is a function of the rotating toothed impellers or gears. Oil is carried in the tooth spaces between the gears and the housing from the inlet to the outlet port. The oil is discharged because it is expelled from the tooth spaces as the teeth mesh.

missions and couplings in tractors, trains, and military tanks.

In 1799 Murdock experimented with an engine which is much like our gear pumps of today. Newcommen in 1705 is credited with originating a cylinder and piston structure. Leonardo da Vinci has written about a steam gun. This device is really a cylinder and piston, the gun bore being the cylinder and the bullet being the piston. In England, about 1785, cup packings were developed for cylinders. Gradually over the years these early structures have been improved, but the principles involved are fundamentally the same.

Hydraulic Systems

What do we mean by the term "hydraulic system"? Before we turn to a discussion of present-day pumps and power units, let us take a moment to set up a general definition of the term on which we can all agree.

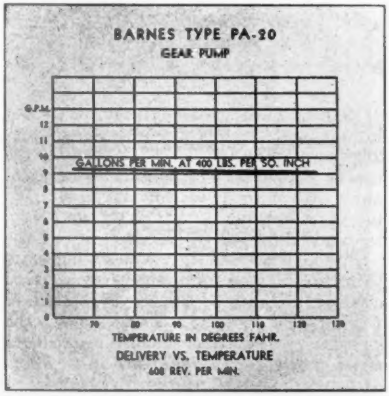
Actually and fundamentally, a "hydraulic system" is a transmission which enables man to take energy from a power line, a rotary shaft of a tractor, or an automobile engine, and cause it to do useful work. The form of energy is changed. It is controlled in amount. It is directed and is delivered to many parts of our machines. This transmission has three main functions:

1. To change energy from mechanical to fluid; as by a pump.
2. To direct and control the fluid energy; by directional and pressure valves, and by pipes.
3. To reconvert fluid to mechanical energy; by means of cylinders and rotary fluid motors.

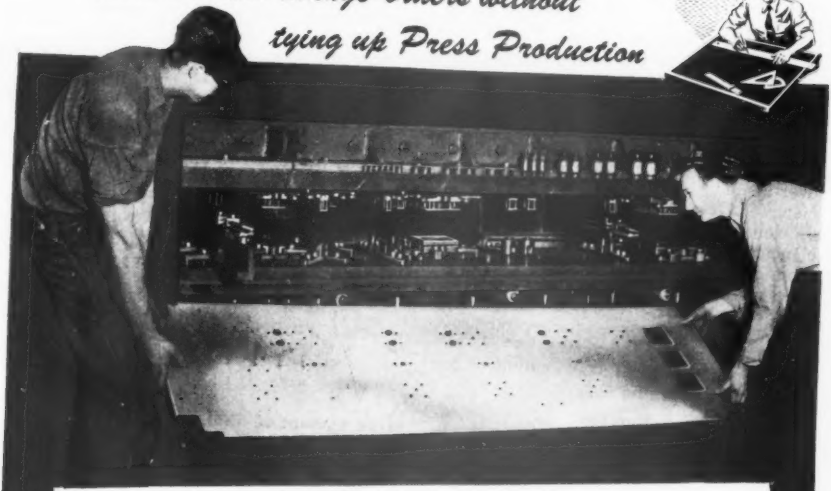
Each function is performed by a structure. Each structure receives energy and delivers it. Unfortunately, each structure delivers slightly less useful energy than it receives. This must be taken into consideration.

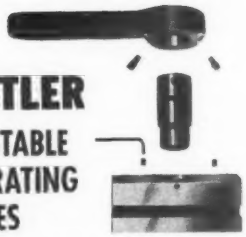
For example, let us take a hydraulic system consisting of a pump, pipe lines, and a rotary motor. Suppose we assume each structure to be 90 percent efficient, and that we deliver 100 hp to the pump drive shaft. 90 hp is delivered, therefore, into the pump line, part of the energy being lost in mechanical and fluid friction in the pump.

Fig. 2. A gear pump performance chart showing that over a temperature range from 70° to 120° F, the pump delivery changed only from 9.3 to 9.1 gpm, while the pressure was maintained at 400 psi.



Meet sudden change-orders without tying up Press Production





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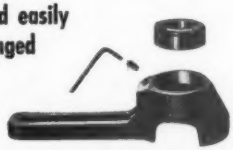

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Due to the pressure drop losses occurring in the pipe lines and valves, only 81 hp remains to be delivered to the cylinder, or rotary motor. As a result of still further losses in the rotary motor, the actual useful mechanical energy available at the motor shaft would be only 73 hp. This is a considerable loss, in reality amounting to a full 27 percent.

It is, therefore, well to remember that over-all efficiency depends on the efficiency of each of the three structures or elements. Consequently, over-all efficiencies in a hydraulic system may vary from as low as 50 percent with low pressure systems to as high as 85 or 90 percent with higher pressures. In general this variation applies whether our system is a rotary transmission or one which contains a linear cylinder for operating a machine fixture.

Pumps

Before discussing specific pumps, let us note some of the principal differences that characterize various pumps.

We can easily see the difference between a rotary pump and a reciprocating pump. We know that if the displacement per revolution of the pump can't be changed, it is termed a "constant delivery" pump. If the displacement can be changed, then a pump is known as a "variable delivery" pump, whether the pump has to be stopped for such an adjustment or not.

If the displacement chambers of a pump positively exhaust all the oil each revolution and very little of the fluid can leak back into the suction, it is called a *positive displacement* pump. If the chamber is not exhausted fully or a large amount of fluid can leak back, it is not positive. A centrifugal pump is not a positive displacement pump.

Some pumps are built for use at low pressures, and are most efficient at these low pressures. Other pumps are built for and are most efficient at high pressures. A high pressure pump, moreover, is inefficient at low pressures.

For machine tools we are specifically concerned with gear pumps, piston pumps, and blade pumps.

Fig. 3. Cross-section of piston type pump. A reciprocating piston is supported and actuated by a pivoted finger which is given an up and down motion from a double row ball bearing eccentrically mounted on the drive shaft.

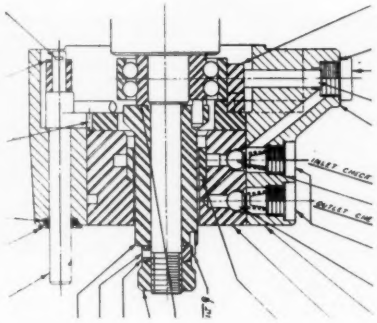

Fig. 4. An inside view of the piston pump showing the roller bearing mounted on an eccentric portion of the drive shaft.

Gear Pumps

We are all familiar with pumps using gears or toothed impellers. They may use two plain gears or one internal and one external gear. Figure 1 shows a gear pump used in Barnes machine tool circuits.

Oil is carried in the tooth spaces between the gears and the housing from the inlet to the outlet port. The oil is discharged because the oil is expelled from the spaces by the mating teeth. There are, of course, side plates which enclose the sides of the gears. In the pump shown, the upper gear is directly driven by drive shaft, while the lower gear is driven by the upper gear, revolving around a stationary or idler shaft in this particular design.

(CONTINUED ON PAGE 108)

The *trend* in the Industry is Toward KEMPSMITH

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Point No. 10

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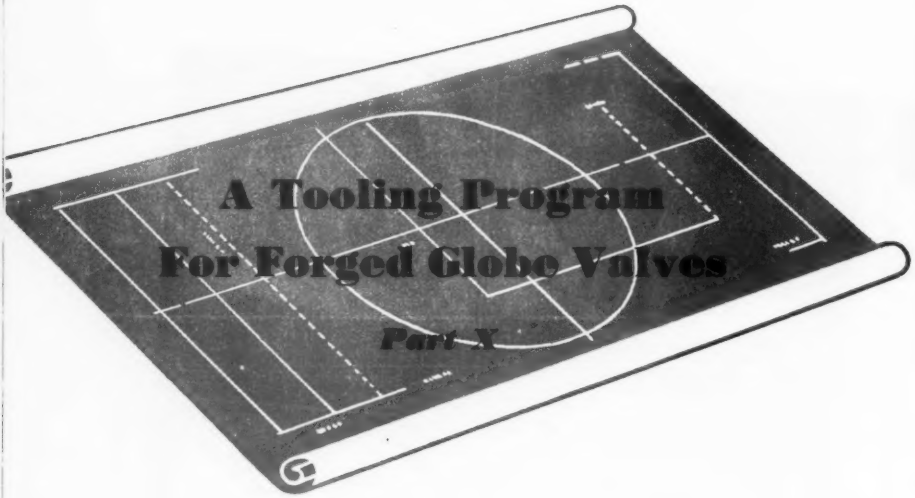


A Tooling Program For Forged Globe Valves

Part X

Tool Design Calculations

Tooling and production methods have been discussed in this series of articles; however, the engineering behind the tool design of the form tools has not been detailed; that could serve as material for a major article in itself.

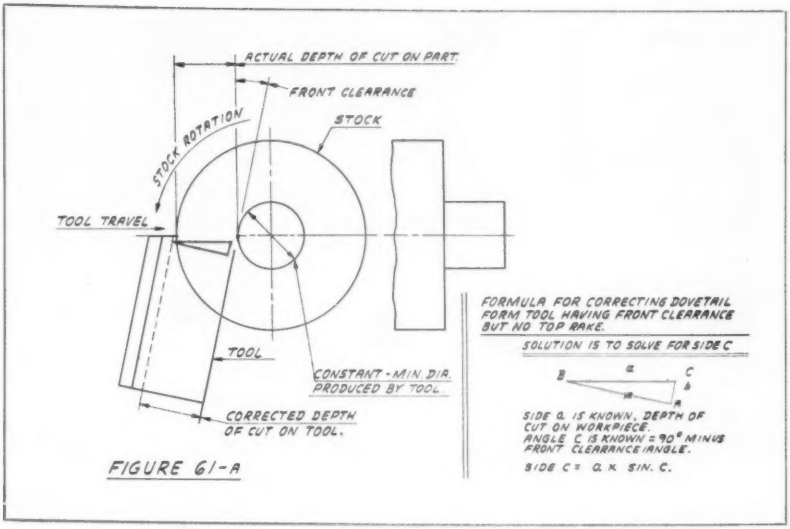
The design of dovetail and circular form tools entails considerable engineering and incurs lengthy calculations in computing the angle corrections to compensate for the angle at which the forming tool is held against the work. A drawing may show certain angles at which surfaces are to be cut on a workpiece; however, the form tools which are to cut these surfaces will have to be ground at different angles because of the angle at which the tool meets the work. This different tool angle is known as a corrected angle and is determined by the method here illustrated.

by Carl F. Benner
Assistant Editor

It is the purpose of this demonstration to show the extent to which calculations are carried out in computing depth corrections for dovetail form tools and the procedure followed in determining the depth to which a tool must be ground for forming one diameter of a workpiece, showing all the operations the tool designer will perform. Where close tolerances are specified on the product, it is necessary to carry the calculations out by long hand; however, if the tolerances are not too close, the computing can be done with a slide rule.

For this demonstration we will assume that on a workpiece having several different diameters, one section is to be reduced from ¾" diameter to ¼" diameter. If the stock is brass, the tool will have no top rake, Figure 61-A, but if the material is steel or aluminum, it will have top rake. Front clearance is provided for in all cases, as this prevents the tool from rubbing on the rotating work.

The amount of top rake and front clearance is determined by the tool designer and in his decision as to what rake and clearance should be used, he will be guided by his experience, the practice in his plant, and the tool steel manufacturer's recommendations.


ACTUAL DEPTH OF CUT ON PART
FRONT CLEARANCE
STOCK
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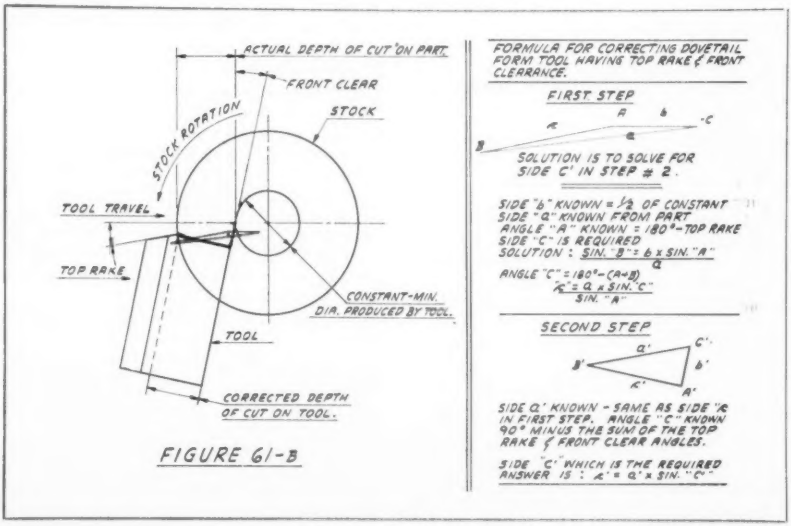
TOOL TRAVEL
TOOL
CONSTANT-MIN. DIA. PRODUCED BY TOOL
CORRECTED DEPTH OF CUT ON TOOL.
FIGURE 61-A
FORMULA FOR CORRECTING DOVETAIL FORM TOOL HAVING FRONT CLEARANCE BUT NO TOP RAKE.
SOLUTION IS TO SOLVE FOR SIDE C
B
a
C
b
A
SIDE a IS KNOWN, DEPTH OF CUT ON WORKPIECE.
ANGLE C IS KNOWN = 90° MINUS FRONT CLEARANCE ANGLE.
SIDE C = a x SIN. C.

Fig. 61. Diagrams illustrating the development of the triangles whose values have to be solved in determining the corrected depth of gash in dovetail form tools to produce specified depth of cut on a workpiece. Formulas and steps followed in solving for the required values are given.


ACTUAL DEPTH OF CUT ON PART
FRONT CLEAR
STOCK
STOCK ROTATION
TOOL TRAVEL
TOP RAKE
CONSTANT-MIN. DIA. PRODUCED BY TOOL
TOOL
CORRECTED DEPTH OF CUT ON TOOL.
FIGURE 61-B
FORMULA FOR CORRECTING DOVETAIL FORM TOOL HAVING TOP RAKE & FRONT CLEARANCE.
FIRST STEP
A
b
C
B
a
SOLUTION IS TO SOLVE FOR SIDE 'c' IN STEP # 2.
SIDE "b" KNOWN = ½ OF CONSTANT
SIDE "a" KNOWN FROM PART
ANGLE "A" KNOWN = 180°-TOP RAKE
SIDE "C" IS REQUIRED
SOLUTION : SIN. "B" = b x SIN. "A"
a
ANGLE "C" = 180°-(A+B)
c = a x SIN. "C"
SIN. "A"
SECOND STEP
a'
C'
B'
b'
A'
SIDE a' KNOWN - SAME AS SIDE 'A' IN FIRST STEP. ANGLE "C" KNOWN 90° MINUS THE SUM OF THE TOP RAKE & FRONT CLEAR ANGLES.
SIDE "c" WHICH IS THE REQUIRED ANSWER IS : c' = a' x SIN. "C"

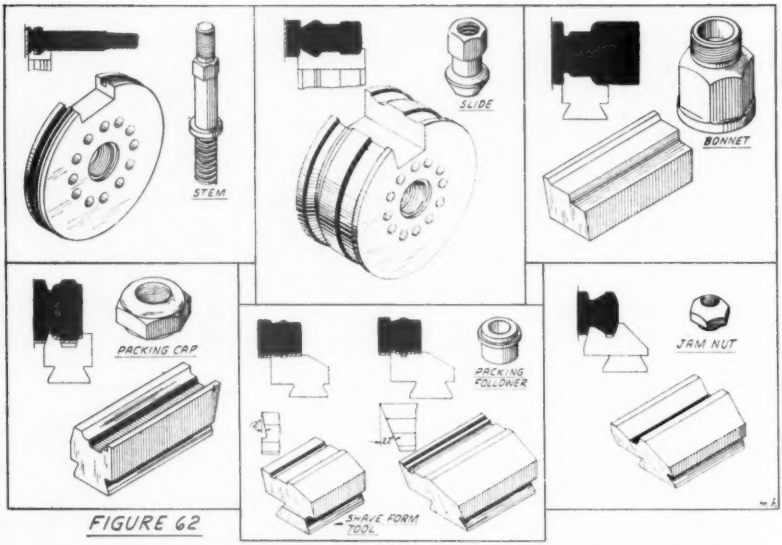


Fig. 62. Components of the Parker offset globe valve machined by form tools, the form tools used, and the shapes formed by the form tools. Each step in these form tools has had to be corrected for depth of gash through the process demonstrated in the text.

If our product material is brass, then the problem is:

Material, Brass; Tool has no top rake; Front clearance 12°.

The known values in the triangle, A-B-C, Figure 61-A, are:

Angle C = 90° − 12° (front clearance) = 78°
side a = .250" (depth of cut on workpiece)
Angle A = 90° (side c is perpendicular to side b)
side c = Required value; the depth of cut to be ground in the tool.
From the trigonometric formula Sin C = c/a

side c = a × Sin C	Calculation
= .250" × Sin 78°	.97815
(From trig tables	.250
Sin 78° = .97815)	4890750
= .250" × .97815	195630
	.24453750

side c = .2445"

Therefore, a gash .2445" deep in the dovetail form tool will produce a cut .250" deep on the workpiece when the tool has no top rake and is set for 12° front clearance.

The solving for corrected depths on form tools used for cutting brass is fairly simple as can be seen, however, when cutting steel or aluminum a top rake has to be considered as well as the front clearance. Computing the depth correction for cutting these materials is more involved as shown by Figure 61-B. The solution is found in two steps, working through two triangles A-B-C and A'-B'-C'.

The known values in triangle A-B-C are:

Top Rake = 10°
Front Clearance = 12°
side b = .125" (½ constant minimum diameter produced by tool)
side a = .375" (Radius of turned diameter)
Angle A = 170° (180° − 10° top rake)
side c = required value.

Since this is an oblique triangle, it is necessary to know the value of angles B and C before solving for side c. From the trig formula:

$$\text{Sin B} = \frac{b \times \text{Sin A}}{a}, \text{ angle B can be found.}$$

$$\text{Sin B} = \frac{.125'' \times \text{Sin } 170^\circ}{.375} \quad \text{(From trig tables Sin } 170^\circ = .17365\text{)}$$

$$= \frac{.125 \times .17365}{.375}$$

Calculations:

$$\begin{array}{r} .17365 \\ .125 \\ \hline 86825 \\ 34730 \\ 17365 \\ \hline .02170625 \end{array}$$

$$.375\overline{)}.02170625 \quad .05788$$

$$\begin{array}{r} 1875 \\ \hline 2956 \\ 2625 \\ \hline 3312 \\ 3000 \\ \hline 3125 \\ 3000 \\ \hline 125 \end{array}$$

$$= \frac{.02170625}{.375}$$

$= .05788$, therefore (by interpolation)

$B = 3^\circ\ 19'\ 6''$

From trig tables the number .05788 lies between Sin 3° 19′ and Sin 3° 20′, which indicates interpolation must be made to find the number of seconds in Angle B.

Interpolation:

$$\begin{array}{rl} \text{Sin } 3^\circ\ 20' & = .05814 \\ \text{Sin } 3^\circ\ 19' & = .05785 \\ \hline \text{difference} & = \quad 29 \\ \text{Sin X} & = .05788 \end{array}$$

$$\begin{array}{rl} \text{Sin } 3^\circ\ 19' & = .05785 \\ \hline \text{difference} & = \quad 3 \end{array}$$

3/29 of 60″ = 6″

Knowing Angles A and B, Angle C is found from:

Angle C = 180° − (angle A + angle B)
Angle A = 170°
Angle B = 3° 19′ 6″ therefore
Angle C = 180° − (170° + 3° 19′ 6″) or
= 180° − 173° 19′ 6″
Angle C = 6° 40′ 54″
side c is found from the formula:

$$c = \frac{a \times \text{Sin C}}{\text{Sin A}}$$

$$= \frac{.375 \times \text{Sin } 6^\circ\ 40'\ 54''}{\text{Sin } 170^\circ}$$

(by interpolation, Sin 6° 40′ 54″ = .11635)

$$= \frac{.375 \times .11635}{.17365} \quad \text{(From trig tables Sin } 170^\circ = .17365\text{)}$$

Calculations:

$$\begin{array}{r} .11635 \\ .375 \\ \hline 58175 \\ 81445 \\ 34905 \\ \hline .04363125 \end{array}$$

$$.17365\overline{)}.043631250 \quad .2512$$

$$\begin{array}{r} 34730 \\ \hline 89012 \\ 86825 \\ \hline 21875 \\ 17365 \\ \hline 45100 \\ 34730 \\ \hline 10370 \end{array}$$

$$= \frac{.0436312}{.17365}$$

$c = .2512''$

From trig tables the number for Sin 6° 40′ 54″ lies between Sin 6° 40′ and

Sin 6° 41′ and must be found by interpolation.

Interpolation:

Sin 6° 41′	= .11638
Sin 6° 40′	= .11609
difference	= 29
29/60 of 54	= 26
Sin 6° 40′	= .11609
	26
Sin 6° 40′ 54″	= .11635

Side c of triangle A-B-C is common with side a′ of triangle A′-B′-C′: Side c′ is perpendicular to side b′, therefore Angle B′ is a right angle and Angle C′ is known, it being 90° = (top rake + front clearance).

The known values are:

side a′ = .2512

Angle C′ = 90° − (10° + 12°)
= 90° − 22°
= 68°

From the formula for the sine of a right angle

Sin C′ = c′/a′

side c′ = a′ × Sin C′

= .2512 × Sin 68° (From trig tables Sin 68° = .92718)

= .2512 × .92718

Calculation:

.92718
.2512
185436
92718
463590
185436
.232907616

side c = .2329″

Therefore the gash cut in a dovetail form tool will be .2329″ deep in order to produce a cut .250″ deep in a workpiece when the tool has a 10° rake angle and a 12° clearance angle. It should be kept in mind that any error made in computing the depth of gash in a form tool is doubled on the diameter of the finished workpiece.

It is not unusual for a product to have a number of different diameters turned on it. For example, there may be four which will then require that each diameter must be treated as just demonstrated so that the corrected depth of the gashes in the tool will produce the part to required specifications, that is four sets of calculations must be made.

The procedure for figuring circular form tools is similar, however, different formulas are used because of the circular shape of the tool.

To illustrate the amount of calculating that has been performed in engineering the form tools for machining the components of the Parker offset globe valve, Figure 62, shows the form tools which are used in forming the parts indicated. Each diameter shown on a part has had to be corrected for depth of gash in the tool, each radius on a part has had to be corrected for on the tool, and any angles on the part, such as appear on the valve slide, packing cap, bonnet and jam nut, have had to be corrected for on the tool.

Acknowledgment:

The writer is deeply indebted to the following members of the Parker Appliance Company staff for their assistance in making available the engineering data, drawings, machining procedures, tooling, and verification of the text in this series of articles: R. L. Hous, A. F. Beaty, Emmet C. Hartley, Paul A. Koehler, Casimir B. Legutki, Geo. Kroger, C. Herke, and Al Smetzer.

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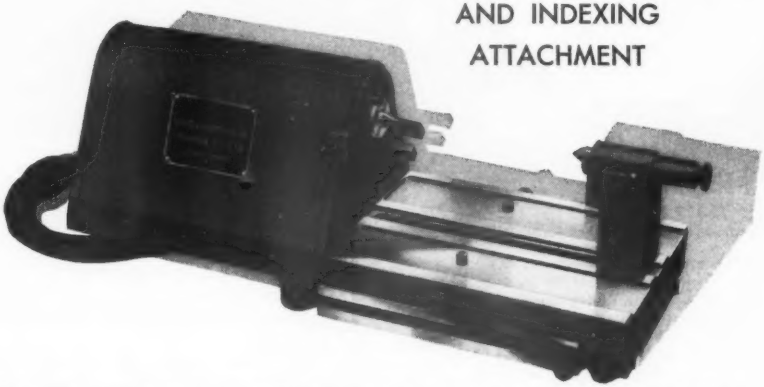

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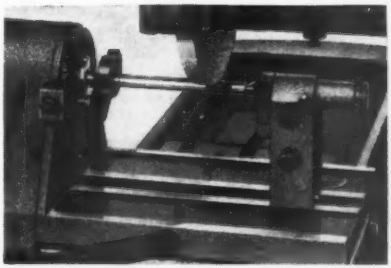

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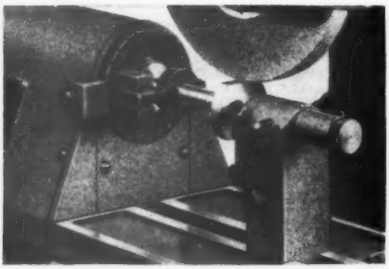

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Casting Qualifications

(CONTINUED FROM PAGE 64)

definite saving of time is gained in running qualified castings in the machine line.

In addition, on a number of occasions, unqualified castings were subjected to rework or the extreme limit of tolerance was used in order to eliminate the necessity for charging castings back to the foundry after considerable machining had been done.

It is regrettable that the time element involved in the operations performed on those castings later rejected is not available, since this would aid in giving an even more accurate figure on actual machine time savings. An unexpected advantage in using qualified castings materialized when it was found that unskilled men or women could replace the higher skilled men on several machining operations due to the simplification or elimination of machine set-up procedure.

The cost of the qualifying fixtures in most cases will exceed the cost of layout equipment and those targeting fixtures necessary in the machine line for running unqualified castings. However, the ability to either eliminate bad castings immediately upon receipt from the

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foundry, or to lower the production of faulty castings will reduce machining costs as well as the cost of the purchase of faulty castings.

Over and above all measurable, tangible factors, remains the important element of quality. The quality of finished parts made from qualified castings is definitely superior to that of the finished parts made from unqualified castings. Even if statistics and technical data did not reveal the benefits and advantages of qualifying castings, it would still be obvious from the mere principle of casting qualification that component parts of an assembly would be improved by virtue of the qualifying process.

The following examples are from figures established during actual production of engine castings at the above-mentioned Wright Aeronautical plant:

Example A, Figure 3

Examination of rejection tickets over a period of several months previous to qualifying castings shows that an insignificant percentage of all castings were rejected at the layout table and charged back to the foundry.

Examination of all Qualifying Weekly Reports since qualifying castings started shows that less than 0.1% of all castings are rejected at the qualifying operation and charged back to the foundry.

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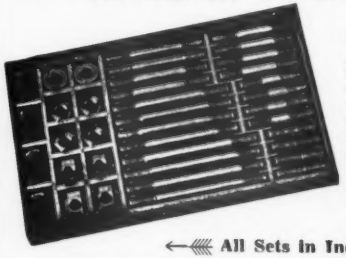

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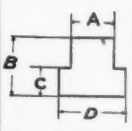

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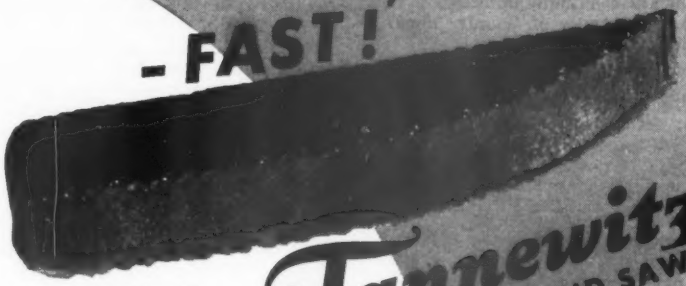

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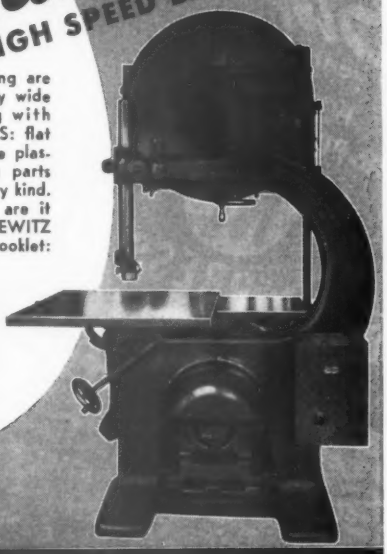

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Rejection Percentage

Rejection tickets show that 1.6% of castings passing the layout table were eventually rejected in the machine line because of foundry dimensional defects.

Rejection tickets show that only 0.6% of all castings passing the qualifying operation are eventually rejected in the machine line because of foundry dimensional defects.

Time Savings

Time for qualifying a casting is 15.50 minutes; for laying out a casting the time is 8.10 minutes.

But, time for machining a qualified casting is 491.35 minutes; the time for an unqualified casting is 564.50 minutes.

Total time saved per casting by qualifying is 65.75 minutes.

Example B, Figure 5

Examination of rejection tickets over a period of several months prior to qualifying castings shows that 0.9% of all castings were rejected at layout and charged back to the foundry.

Examination of all Qualifying Weekly Reports shows that 6.4% of all castings are rejected at the qualifying operation and charged back to the foundry.

Rejection Percentage

Rejection tickets show that 3.9% of castings passing the layout operation

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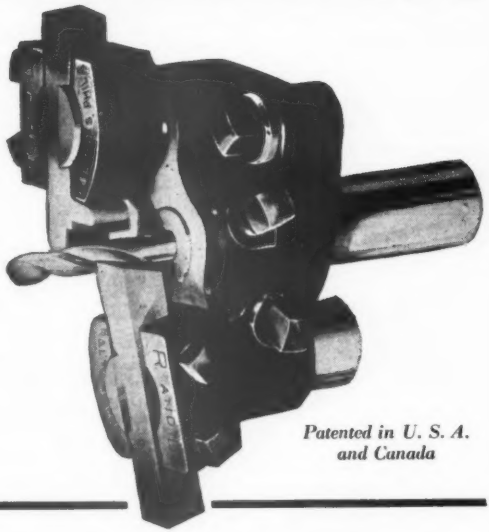

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were eventually rejected in the machine line because of foundry dimensional defects.

Rejection tickets show that only 0.2% of all castings passing the qualifying operation are eventually rejected in the machine line because of foundry dimensional defects.

Time Savings

Time for qualifying a casting is 15.10 minutes; for laying out a casting the time is 6.80 minutes.

But, time for machining a qualified casting is 415.85 minutes; the time for an unqualified casting is 487.55 minutes.

Total time saved per casting by qualifying is 63.40 minutes.

Example C, Figure 4

Examination of rejection tickets over a period of several months previous to qualifying castings shows that 0.1% of all castings were rejected at the layout table and charged back to the foundry.

Examination of Qualifying Weekly

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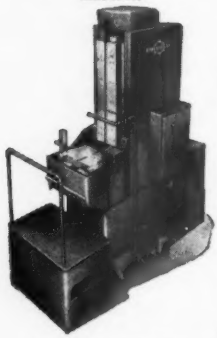

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The 93 acres of industrial property, in the outlying district of Vancouver, has an extensive frontage on the Columbia River and is served by three railroads. Electric power is available in large amounts for the operation of the high temperature furnaces in which silicon carbide is produced.

Plans call for the erection of a silicon carbide furnace plant, including buildings for the preparation of raw materials, a mixing plant, and crushing unit, along with an office, maintenance building and employee facilities building.

Reports since qualifying castings started indicates that 0.6% of all castings are rejected at the qualifying operation and charged back to the foundry.

Rejection Percentage

Rejection tickets show that 0.5% of all castings passing the layout operation were eventually rejected in the machine line because of foundry defects.

Rejection tickets show that a negligible percentage of all castings passing the qualifying operation are eventually rejected in the machine line because of foundry dimensional defects.

Time Savings

Time for qualifying a casting is 8.20 minutes; for laying out a casting the time is 1.80 minutes.

But, time for machining a qualified casting is 426.50 minutes; the time for an unqualified casting is 452.10 minutes.

Total time saved per casting by qualifying is 19.20 minutes.

In this particular case, the castings which had undergone qualification were so superior in quality after machining that special notice of this difference was made by the inspection and assembly departments. This was due to the great number of bosses and shoulders which were required to clean up with both an equal amount of stock around holes and a completely finished flat surface.

(TO BE CONTINUED)

Announce Merger

The name of The Bingham Stamping Company has been changed to The Bingham-Herbrand Corp., as a result of the merger of The Bingham Co. of Toledo, Ohio, and the Herbrand Corp. of Fremont, Ohio. Bingham, one of the leading manufacturers of emergency brake lever assemblies and Herbrand, a leader in the commercial drop forging and mechanic's hand tools fields, will operate as divisions.

The two plants, occupying approximately 194,000 sq. ft., include over $300,000 in new buildings and equipment acquired during the last year. It is believed that the name change will clarify the firm's organization to the general public.

USE the RIGHT BLADE for every job
Write on your letterhead today for your free Victor wall chart and hang it near the tool crib or in your machine shop for ready reference. It's absolutely free.

NOW YOU SEE AT A GLANCE

- WHICH BLADE TO USE
- HOW BEST TO USE IT

Printed attractively in two colors this Victor chart tells at a glance exactly which hand, band, or power blade to use on *any* material. It gives money-saving, work-speeding suggestions on the proper use and care of blades.

Turn to your Victor supplier, too, for better-cutting, longer-lasting blades. He has a Victor blade for every job a hack saw or band saw can do—one that you can rely on to give you fast, clean cuts on metals, plastics and other non-metallics.

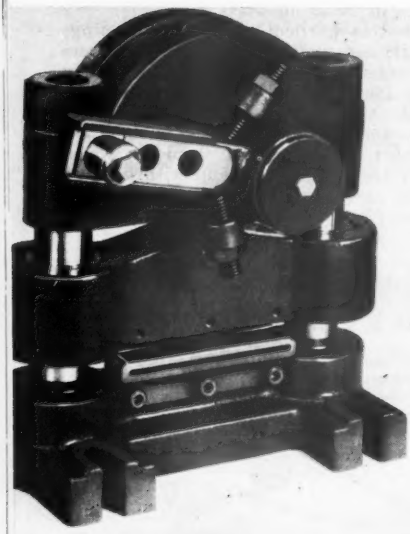
2375

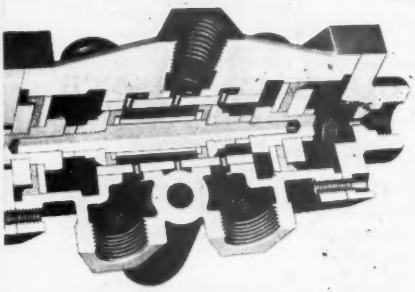
VICTOR SAW WORKS, INC.
MIDDLETOWN, N. Y., U. S. A.

Makers of Hand and Power Hack Saw Blades, Frames and Band Saw Blades

PROGRESS

NEW DEVELOPMENTS • IMPROVEMENTS • COST AND TIME SAVERS





FOR FURTHER INFORMATION FILL IN KEY NUMBERS ON POSTAGE-FREE INFORM-A-GRAM INSERT

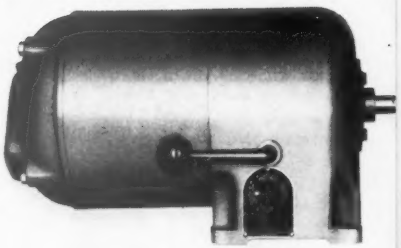
USABLE WITH ALMOST ANY PUNCH PRESS, the compact, ram-driven scrap cutter announced by Haller Machine & Mfg. Co., Inc., will cut all stock to 4" width and 3/8" thickness and offers worthwhile economies through ease of scrap handling and increased value of the cut scrap. This D-611 Scrap Cutter measures only 6½" wide x 9¼" deep x 10" high overall. Mounted on the bolster plate of the press, it is driven directly from the ram or die, and is adjustable for any length ram stroke up to 6". Full details are available from HALLER MACHINE & MFG. CO., INC., Dept. 36, 7940 Tireman Ave., Detroit 4, Mich., or use INFORM-A-GRAM Key No. L36-C.

COMPLETELY REDESIGNED and now available in 79 standard models, the improved line of air control valves announced by the Logansport Machine Co., Inc., features advanced sliding piston-type construction which eliminates valve seats and rod packing. Employed in manufacturing and processing operations of all kinds, as well as for original installation in air operated equipment on the market, Logan 4-way air valves are offered in a wide range of control types. Descriptive literature and detailed information is available upon request to LOGANSPORT MACHINE CO., INC., Dept. 3-72, Logansport, Ind., or use INFORM-A-GRAM Key No. 372-C.

ENGRAVING, PROFILING, GRADUATING, MILLING and drilling of circular name plates, dials, round dies, etc., are jobs easily handled on the Preis 5-inch diameter rotary work table which, due to its compactness and low build, may be adapted to nearly all engraving machines and small production milling and drilling machines. Get detailed information from H. P. PREIS ENGRAVING MACHINE CO., Dept. 58, 159D Summit St., Newark 4, N. J., or use INFORM-A-GRAM Key No. D58-C.

ON PARADE

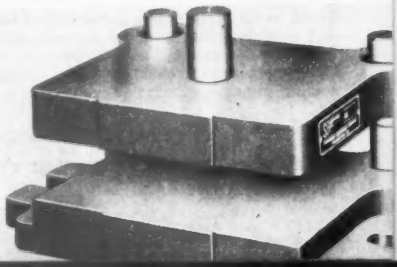
BUILT TO DRIVE MACHINERY requiring selective speeds, the four-speed, Type R Lima Gearshift Drive is announced by The Lima Electric Motor Co. Now available in sizes of ½ hp at 1200 rpm and ¾ hp at 1800 rpm, the new single phase units will operate on 115 and 230 volts ac, 50 and 60 cycle. The single phase and polyphase units are alike mechanically. For additional information, write THE LIMA ELECTRIC MOTOR COMPANY, 801 Findlay Rd., Lima, Ohio, or use INFORM-A-GRAM Key No. 571-C.



LASTING 300 DAYS, as compared to two days, and requiring no work stoppage for replacement, the Adamas Tungsten Carbide Wire Straightening Die, developed for a steel company to reduce their costs and machine down time, has proved equal to 150 of the chilled iron type castings used before. For sizes from ¼" to ½" diameter and up, a carbide insert is made in a casting; for smaller wire dies, a solid carbide die is employed. These dies are made for Lewis, Shuster and Wells wire straightening machines. Get additional information from ADAMAS CARBIDE CORP., Dept. 81, 1819 Broadway, New York 23, N. Y., or use INFORM-A-GRAM Key No. A81-C.

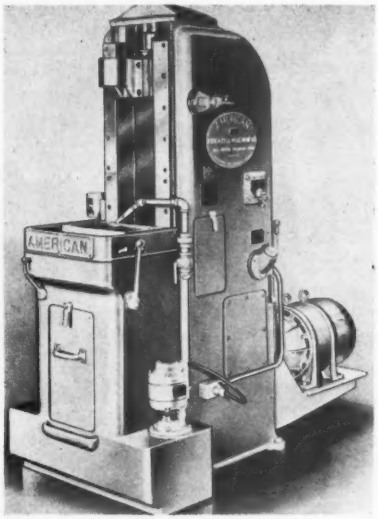
ADAPTABLE TO A WIDE VARIETY OF APPLICATIONS, the new Halfco Spherical Self-Aligning Bearing is unique in design. Including only two pieces, it permits low cost, volume production methods to be employed in its manufacture. It allows the greatest possible misalignment and resists both axial and radial thrusts. Complete data obtainable from ADEL PRECISION PRODUCTS CORP., Dept. 84, 10777 Van Owen, Burbank, Calif., or use INFORM-A-GRAM Key No. L84-C.

ELIMINATING THE EXPENSE of setting up the dies every time a job is repeated, "Standard" all-steel die sets in a complete range of sizes for all presses are offered by Standard Machinery Co. Parts are fully interchangeable, ground and bored to close limits. Catalog section DS lists prices and specifications; write STANDARD MACHINERY CO., Dept. 30, Providence, R. I., or use INFORM-A-GRAM Key No. F30-C.



PROGRESS ON PARADE

OFFERING IMPROVED DESIGN, the Vertical Hydraulic Type T-3-way Broaching Machine, manufactured by the American Broach & Machine Co., features an enlarged reservoir coolant assembly and minor changes in the work table. Coolant is supplied from the reservoir located on the side of the machine; controlled through start and stop push button station. The pumping unit is mounted for easy maintenance. Adaptable to push, pull and surface broaching operations, this machine is manufactured in 4, 6, and 8 ton sizes with 24" stroke and 6, 10, and 15 ton sizes with 36" stroke. Full descriptive information is in a new 8-page, 3-color circular



giving the application, operation and specifications of this complete line; available from AMERICAN BROACH & MACHINE CO., Dept. 7-08, 411 W. Huron St., Ann Arbor, Mich., or use INFORM-A-GRAM Key No. 708-C.

PARTICULARLY SUITABLE FOR SEALING APPLICATIONS where oil lubrication is at a minimum, or where shaft rpm and rubbing speeds are high, new Gits High Speed Carbon Faced Seals have a low coefficient of friction and self-lubricating qualities as well as being heat-resistant, not subject to warping, chemically inert and corrosion resisting. A special sealing principle eliminates wear on the shaft and the need for replacement of grooved shafts. Applicable to both horizontal and vertical shafts, these seals require a minimum amount of space diametrically and axially. Complete information may be requested from GITS BROS. MFG. CO., Dept. 23, 1872 So.

Kilbourn Ave., Chicago, Ill., or use INFORM-A-GRAM Key No. L23-C.

DEVELOPED FOR USE WITH HIGH SPEED STEEL CUTTING TOOLS, the new RED-E Standard Ball Bearing Centers manufactured by The Ready Tool Co. are available in both Shank and Ball, and Roller Bearing Types. New Departure double row angular contact preloaded precision ball bearings maintain smooth operation, provide thrust capacity one and a half times radial capacity. Construction is of all-alloy steel with heat treated spindle. Labyrinth enclosure prevents entry

of cutting oil or chips and escape of lubricant. Full information, engineering data and prices are in Bulletin 472, available from THE READY TOOL CO., Dept. 42, 555 Iranistan Ave., Bridgeport, Conn., or use INFORM-A-GRAM Key No. L42-C.

NUPLA MALLETS . . .

with Interchangeable Tips

Tough — Resilient — Self-Healing
Will not mar machined or delicate surfaces
No sting, vibration or rebound
Will not "gash", mushroom or chip

"A Mallet for Every Purpose and A Purpose for Every Mallet"

When ordering state grade ("S"-Soft, "M"-Medium, "T"-Tough)

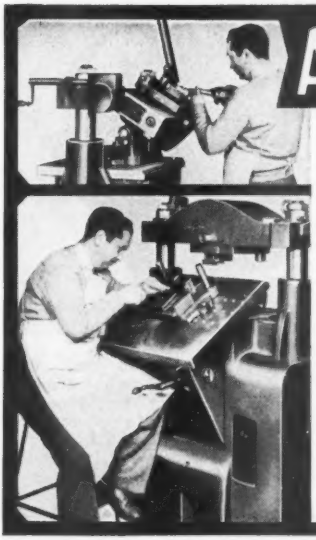
COMPLETE MALLETS

Mallet No.	Head Dia.	Weight	Head Length	Price Each	Min. Pkg.	Mallet No.	Head Dia.	Weight	Head Length	Price Each	Min. Pkg.
100	1"	5 Oz.	3½"	$2.00	6	250	2½"	2 Lb.	5¾"	6.50	4
105	1"	8 Oz.	3½"	2.25	6	255	2½"	4 Lb.	5¾"	7.50	4
150	1½"	¾ Lb.	4⅜"	3.00	6	300	3"	3½ Lb.	6½"	10.00	2
155	1½"	1¼ Lb.	4⅜"	3.25	6	305	3"	6 Lb.	6½"	11.00	2
200	2"	1¾ Lb.	4½"	4.00	6	307	3"	9 Lb.	6½"	16.00	1
205	2"	2 Lb.	4½"	4.50	6	308	3"	12 Lb.	6½"	18.00	1
207	2"	3 Lb.	4½"	5.25	4						

Extra Tips May Be Obtained for Replacement.

ACME TOOL COMPANY

71 WEST BROADWAY — NEW YORK 7, N. Y.



ALPHA

THE NEW DIE TRY-OUT PRESS

TRY DIES UNDER ACTUAL PRODUCTION CONDITIONS!

FINISH DIES WITHOUT REMOVING FROM PRESS!

Saves time! Saves back-breaking labor! Increases accuracy! Cranks retract locating pins and tilt bolster and head so finishing work can be performed on either member of die. An accurate check on corrections is then possible since die returns to its original position.

Alpha is a production type press that brings to light necessary corrections that are not detected in regular try-out presses.

Write for literature and prices to Alpha Tool Works, 9281 Freeland, Detroit 27, Michigan.

PROGRESS ON PARADE

ESPECIALLY ADVANTAGEOUS when it is necessary to lengthen or shorten the stroke of an air cylinder piston for different applications where an equal amount of force is required, the adjustable stroke air cylinder developed by Anker-Holth Mfg. Co. can re-

place several cylinders of set stroke construction. A stop piston, which is well packed to prevent air leakage, is also provided for setting the required stroke. Further details may be requested from ANKER-HOLTH MFG. CO., Dept. 9-52, Port Huron, Mich., or use INFORM-A-GRAM Key No. 952-C.

FOR MELTING LEAD, TIN, ZINC, POT METAL, type metal, aluminum, etc., the new model No. 1019 Metal Melting Furnace announced by Johnson Gas Appliance Co. is equipped with nine burners, each separately controlled. It will handle 1000 lbs. of lead

and render up to 1400° F. temperatures; automatic controls are available. Heavy insulation prevents heat loss. Request other data from JOHNSON GAS APPLIANCE CO., Dept. 6-05, Cedar Rapids, Iowa, or use INFORM-A-GRAM Key No. 605-C.

ELIMINATING THE HIGH COSTS of bottled welding gases and high rental expense of cylinders, the new Phillips Arc Torch makes every arc welding machine available for

practically every welding, brazing or heating job. Current conducting members of the torch are two concentric metal tubes, one sliding easily within the other and insulated by a fiber sleeve, thus automatically maintaining alignment for all adjustments of arc gap width. Special details and numerous features of this torch will be explained if requests are directed to C. E. PHILLIPS & CO., Dept. 24, 2750 Poplar St., Detroit 8, Mich., or use INFORM-A-GRAM Key No. A24-C.

FEATURING "REVERSED-FLOW" AIR CONTROL, the new line of "New-Matic" taper and pneumatic gages, developed and produced by Merz Engineering Co., include both calibrated measurement scale of the required magnification and "zero" adjustment for re-

turning the calibration to a basic value. These gages are equipped with continuously variable and adjustable orifices, which, through air volume and air pressure control, render "balanced-air" for high precision measurement. In five models to meet varied requirements, Merz New-Matic Gages are not just comparators, but actual measuring machines. MERZ ENGINEERING CO., Dept. 7-20, 200 S. Harding St., Indianapolis 7, Ind., or use INFORM-A-GRAM Key No. 720-C.

Buy KIPP AIR GRINDERS Because

The RPM's stay up while grinding... not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind — not just rub. Every mechanic knows this, but inexperienced buyers may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work—longer wheel life.

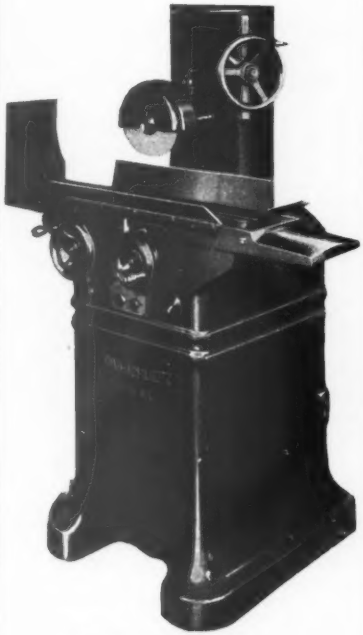
Buy Kipp air tools for best results, lower prices.

MODEL JA
50,000 R.P.M.
$33.25
IN U.S.A.

Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

MADISON-KIPP CORP.
212 Waubesa St., Madison, Wis., U. S. A.

- Skilled in DIE CASTING Mechanics
- Experienced in LUBRICATION Engineering
- Originators of Really High Speed AIR TOOLS



BOYAR-SCHULTZ No. 618
PRECISION SURFACE GRINDER

MANY superior features make this Boyar-Schultz Surface Grinder an outstanding performer in producing the fine finish and extreme accuracy necessary in the finest of gage, tool and die work as well as in some production grinding.

Its sturdy ruggedness maintains that fine accuracy for a long period of time . . . much longer than similar machines are expected to last.

The result of this long lasting precision performance is greater economy.

Write for Circular

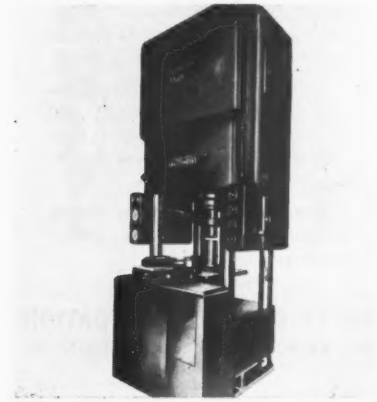
BOYAR-SCHULTZ CORPOATION
2112 WALNUT STREET . CHICAGO 12, ILL.

PROGRESS ON PARADE

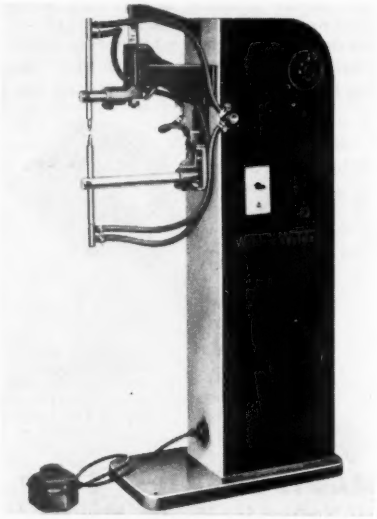
HANDLED WITH MINIMUM EFFORT, the new Tumico micrometers, manufactured by the Tubular Micrometer Co., are up to 50 percent lighter, thus reducing operator fatigue

and improving overall precision measuring. A wear takeup spindle bushing assembly compensates for wear on the spindle, at the top and on the thread. Accurately made of high grade alloy, these micrometers will not distort, rust, tarnish, or corrode. They are furnished in a variety of types for numerous precision measuring requirements. Request other data from TUBULAR MICROMETER CO., Dept. 91, St. James, Minn., or use INFORM-A-GRAM Key No. B91-C.

FEATURING A REVOLUTIONARY "VIBRATORY CONTROL", the new 75-ton Denison Multipress offers a wide range of ram actions and controls unique in a press of its size. Its choice of three valve combinations enables it to meet practically every pressing-cycle need within a 75-ton range. Versatile operating characteristics include automatic or manual ram cycling, fast traverse, slow pressing speed, pressure and distance reversal, low ram tonnage, roomy tooling area, one-man operation, and pressurized filter system. Pressure variance is from 7½ to 75 tons. Other inquiries should be addressed to THE DENISON ENGINEERING CO., 1197 Dublin Rd., Columbus 16, Ohio, or use INFORM-A-GRAM Key No. 260-C.



FEATURING A HIGH POWER-SPACE RATIO for continuous production welding, the new high speed, fully automatic air-operated spot-welder series announced by Weldex, Inc., includes two models. Welding on thin metals up to two thicknesses of 14 gauge



cold rolled steel or equivalent, these machines have a built-in transformer, tap changing switch, solenoid air valve, single-acting air cylinder, adjustable air-operated pilot switch, magnetic contactor and electrical timer which controls all phases of the welding cycle. This machine, its equipment and accessories are fully explained in a new 10-page catalog which may be requested from WELDEX, INC., Dept. K, 7303 McDonald Ave., Detroit 10, Mich., or use INFORM-A-GRAM Key No. L41-C.

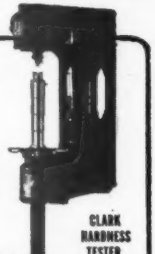
CLARKATOR CHECKS DIAL INDICATORS

CLARK

Gives Continued Accuracy, Rapid Measurements

THE CLARK has everything you want in a hardness tester—direct reading precision dial, durable construction, ease of servicing. Three standard models shipped complete with weights, dust protectors, diamond and steel penetrators, test blocks, and anvils.

CLARKATOR CHECKS DIAL INDICATORS with micrometer speed and sine bar accuracy. Easy to operate—just four simple steps. Complete instructions permanently fastened to base.



CLARK HARDNESS TESTER

MASTER DIAMOND CHECKING SET

MASTER DIAMOND CHECKING SET eliminates hardness tester errors. Consists of a master diamond penetrator and two test blocks. Precision is assured over a long period because the set is used only for checking. Furnished in leather case.

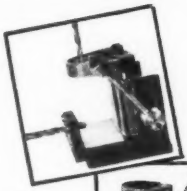
Learn the truth about hardness testing! This 20-page reference manual (right) contains information on history, theory, practice, and equipment for modern hardness testing. Available to executives without charge. Write Dept. MMS today!

CLARK INSTRUMENT, INC.

10200 Ford Road. • Dearborn, Mich.

LIFT·SWING PATENTED

Fixtures for DRILLING TAPPING - COUNTERBORING INSPECTION - *at one setting*



Lift-Swing in closed position

Lift-Swing open—note absence of projections over work

Amazing savings made by users of the Lift-Swing Fixtures shown here because Bushing Plates LIFT and SWING aside for inspection of work or additional machining operations—AT ONE SETTING.

Die Set accuracy is maintained because hardened and ground bushings in plate slide on stationary guide and pilot pins.

Right angle bearing faces permit drilling in two planes—cam lock release handle permits FAST OPERATION.

TOP PLATES INTERCHANGEABLE

Bushings and pins always locate bushing plates in exactly the same position—a single base can be used for several jobs.

11 standard sizes with clearance between base and bushing plate from 2¼" to 7". Base sizes from 2¼" x 4¼" to 4" x 8".

Send for 8-Page Bulletin

Acme Tool Manufacturing Company

52 Perry St., Belleville 9, N. J.

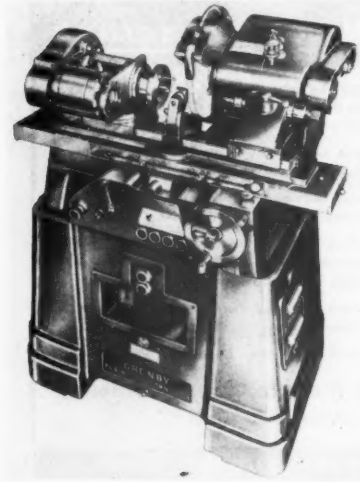
SEND FOR NAME OF NEAREST SUPPLY HOUSE

PROGRESS ON PARADE

STREAMLINED TO FIT THE OPERATOR'S HAND, the Duro improved model Heavy-Duty Grinder offers high speed, smooth, vibrationless operation and ample power for every job. Driven by a Duro Universal Motor, it operates on AC (60 cycles or less) or DC current, and has a propeller type fan to keep

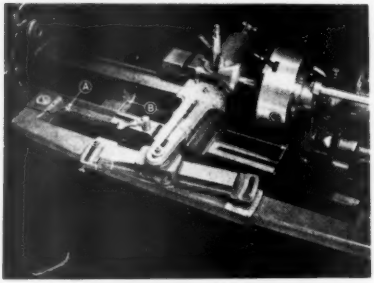
working parts cool at all speeds. A specially designed threaded type collet chuck overhangs the housing only $\frac{5}{16}$", enabling easy handling of delicate precision work. Other data may be requested from DURO METAL PRODUCTS CO., Dept. 81, 2651 N. Kildare Ave., Chicago 39, Ill., or use INFORM-A-GRAM Key No. L81-C.

EASILY FITTED WITH TWO HEADS for conversion to combination external-internal grinders, both of the new Hydraulic Grinders announced by Grenby Mfg. Co. feature accurate stops for maintaining size, lever collet



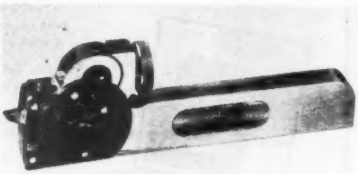
closer, hydraulically operated table, semi-sizing diamond dresser and coolant unit, making them similarly applicable in production work or as tool room equipment. These machines, the Universal External Grinder EG-103 and Universal Internal Grinder IG-103, will be further detailed by the GRENBY MFG. CO., Dept. 45, Whiting St., Plainville, Conn., or use INFORM-A-GRAM Key No. E45-C.

EASILY INSTALLED IN A FEW MINUTES, the heavy duty Master Taper Attachment developed by Master-Taper Co. for all lathes having from 13" to 26" swing is a sturdy, simple and efficient mechanism with many features. The swivel bar has V-ways with

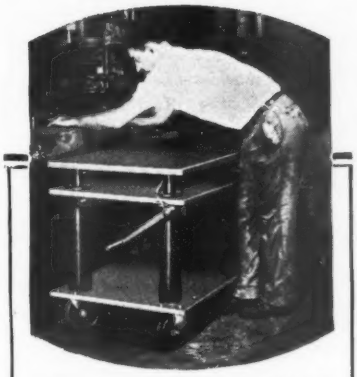


the ends graduated, one in degrees and the other in inches per foot; a long bearing on the swivel bar with gibs compensates for continuous wear. Available in two sizes, 34" or 40" between arms, this attachment will be more fully explained by MASTER-TAPER CO., Dept. 83, 126 N. Clinton St., Chicago 6, Ill., or use INFORM-A-GRAM Key No. F83-C.

REDUCING THE OPERATING TIME required to cut a thread in a lathe by more than 40%,



the Ideal Threading Tool Holder developed by Guarantee Tool Co., Inc., eliminates the gooseneck usually found in a threading tool. This new holder, for handling a single point cutting tool, is so constructed that it will retract in a horizontal plane away from the work when the pressure is too great for efficient cutting. GUARANTEE TOOL CO., INC., Dept. 78, 96 Maple St., West Orange, N. J., or use INFORM-A-GRAM Key No. L78-C.



WHEN WEIGHT MUST BE MOVED

SEND *one* MAN and PORTELVATOR

Stop idle machine time! With Portelvator, the Hamilton Portable Elevating Table, one man can safely lift and carry loads usually requiring the strength of four.

Three table surfaces. **Four point support.** Working area accessible from all sides. Slow lift for heavy loads. Fast lift for light loads. Floor lock for rigid positioning. A practical tool in any plant.

Be practical! Investigate! Write for Bulletin P-47.

SUPER SENSITIVE DRILLING AND TAPPING MACHINES · PORTELVATORS

THE Hamilton TOOL COMPANY

832 SO. NINTH STREET · HAMILTON · OHIO · U. S. A.

In manufacture of special tools for maximum production the skill of the tool craftsman is the most essential element.

Andersons, Inc., specializing in precision tools and fixtures are so manned and equipped as to assure the best in tool design and craftsmanship.

Your inquiries for special tooling are solicited and will receive prompt efficient service. Let us help you solve your tooling problems.

GAGES, FIXTURES, SPECIAL TOOLS

FORM TOOLS—DOVETAIL AND CIRCULAR MILLING CUTTERS—END MILLS—REAMERS

Write Us or Phone Buckingham 3417

Andersons, Inc.

2329 NELSON ST., CHICAGO 18, ILL.

MR. PLANT MANAGER . . . .

. . . . . *You'd Be Amazed*

NS STANDARD KNOB SHOE ASSEMBLY

Knob, cast iron, cadmium plated; thread length, case hardened and hard-chrome flashed. Complete range of sizes to meet every need.

at how much you can save on special tooling by using NS Standard Jig and Fixture Parts.

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NS Standard Knob Shoe Assemblies (one of 300 *stock* items in the NS line) cost you only $2.10 to $3.50 each, depending on size. These same parts, "tailormade" in your plant would cost you $10.00 to $15.00 a piece.

Equally spectacular savings will result from using any of the other NS Standard Jig and Fixture Parts.

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NOBLE & STANTON, INC.

Manufacturers of Tools, Gages and Their Accessories

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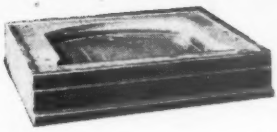
CASTING OR CARVING?



Usually it's easier, faster, and cheaper to cast metal in the contour of a die than to machine the die out of a solid block.

As for the final result, experience has proved that dies cast of ***STRENES METAL*** deliver an extraordinary number of stampings between redressings. The principal reason is that the ***STRENES METAL*** formula is adapted to the specific job which the die is intended to do.

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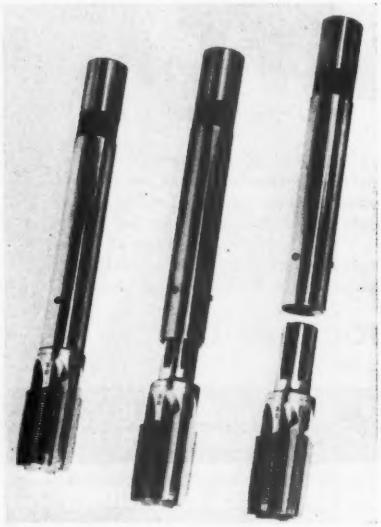
PROGRESS ON PARADE

REDUCING TOOL COST WHILE SPEEDING UP PRODUCTION, the nib-type "M-11" taps designed by the Detroit Tap and Tool Co. are coupled to hollow shanks. Particularly useful in the tapping of pipe couplings where

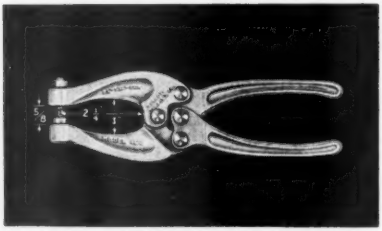


long shank taps are normally used to tap through several parts one after the other and the tapped parts are allowed to load up on the long shank, this new style tap reduces weight that has to be handled by the operator. Made of Detroit Tap's exclusive M-11 cobalt-chrome high speed steel, the nib tap, which is the only part requiring replacement, is approximately half the cost of the solid shank variety. The unit weighs 30% less than a solid tap of the same size. Inquiries for other information should be directed to DETROIT TAP & TOOL CO., Dept. 1-34, 8432 Butler Ave., Detroit 11, Mich., or use INFORM-A-GRAM Key No. 134-C.

EQUIPPED WITH A METAL RAIL on which point indicators slide, a new drafting ruler

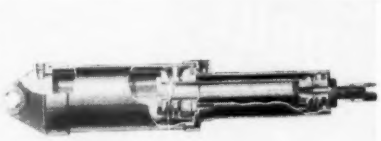
permitting the user to make and hold points has been developed by Chowns Mfg. & Design Co. Indicator fingers of red enamel just clearing the edge of the rule on both sides are easily visible and adjustable. Delivering with two point indicators, this ruler may be fitted with additional points to meet the needs of the work. Get data from CHOWNS MFG. & DESIGN CO., Dept. 80, 16535 Manchester, E. Detroit, Mich., or use INFORM-A-GRAM Key No. L80-C.

SUITABLE FOR A WIDE VARIETY OF JOBS, the new portable toggle clamp produced by Detroit Stamping Co. utilizes toggle lock action to hold parts in position for drilling, riveting, welding, gluing, etc., and other



operations necessitating quick positive pressure on light gauge materials up to 3/8" total thickness. Adjustable for pressures on various thicknesses, this tool has a narrow nose for use in restricted spaces. Descriptive literature will be sent upon request from DETROIT STAMPING CO., Dept. K, 344 Midland Ave., Detroit 3, Mich., or use INFORM-A-GRAM Key No. 165-C.

PERMITTING OPERATIONS WITH ONLY ONE CONTROLLED AIR LINE, the new line of Differential Air Engines announced by National Pneumatic Company incorporates simplicity in piping and controls which makes



it desirable for use in multiple hook-ups or where controls are located some distance from the engine. Positive air power may be obtained in both directions; available sizes deliver "in-stroke" power ranging from 100 to 1335 pounds, and "out-stroke" power from 105 to 1070 pounds. Other features include non-locking piston rod and the elimination of

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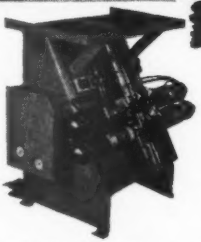

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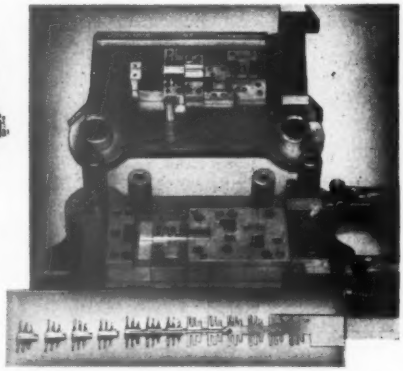

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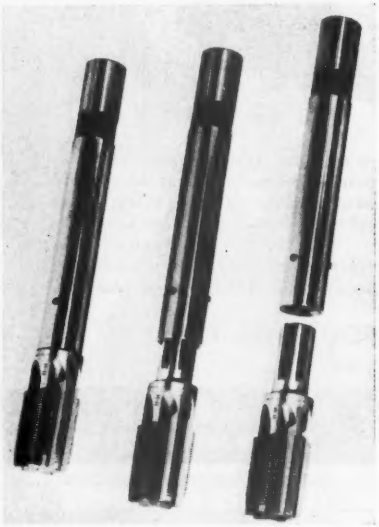

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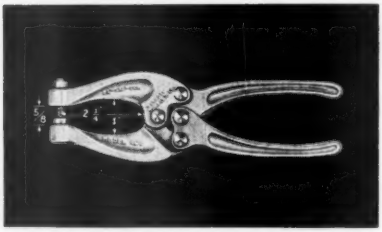

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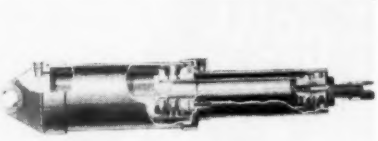

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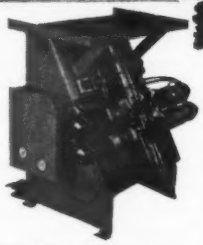

A special machine fully designed and engineered by CRT craftsmen to perform four operations in two stations to tolerances within .0005 at the rate of 1500 pieces per hour

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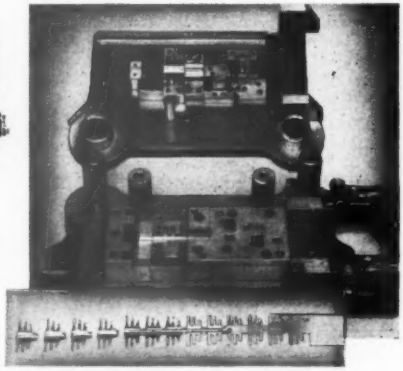

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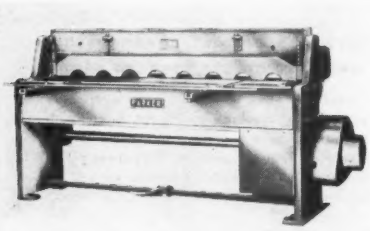
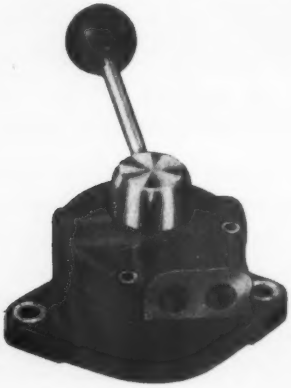
piston binding. NATIONAL PNEUMATIC CO., Dept. 71, Industrial Sales, Rahway, N. J., or use INFORM-A-GRAM Key No. G71-C.

BUILT FROM EXTRA-HEAVY ALL STEEL WELDED PLATE, normalized to relieve stresses and powerfully reinforced, the new 10-gauge



power Squaring Shear, in production at Parker Mfg. Co., is of strength equal to larger and heavier machines. Of compact, box-type design with a low center of gravity for minimum vibration, the Parker shear stands only 47" high and weighs 4250 lbs. This machine features a five hp motor which renders 85 strokes per minute. It has a 73" cutting length, 75" blade, a back gauge range of 18" and a 38" front gauge range. Inquiries will be welcomed by PARKER MANUFACTURING CO., Dept. 53, 2200 Colorado Ave., Santa Monica, Calif., or use INFORM-A-GRAM Key No. K53-C.

ALLOWING HALF OF THE COMPRESSED AIR used in the power stroke of a double acting air cylinder to be used to return the piston, the new 4-way air valve, the "Air Miser," being produced by Knox Industries, Inc.,



features a by-pass port in the bronze disc which accumulates 50% of the air normally wasted with usual valves. An auxiliary port is also available, however, if more air is needed to return the piston; thus the "Air Miser" serves equally well as a conventional valve. For use with all double-acting air cylinders, this 4-way by-pass air valve is all metal with no packings, has lapped surfaces, is self-sealing, easy operating and fast acting. Get full details from KNOX INDUSTRIES, INC., 5590 N. Main Street, Lexington, Mich., or use our INFORM-A-GRAM Key No. L86-C.

JUMBO, THE HEAVY TOGGLE-ACTION CLAMP announced by Knu-Vise, Inc., is capable of exerting a pressure of 1350 lbs. at the extreme end of the toggle bar with a man's

normal hand pressure on the handle. Because of special base design embracing an integral front bracket and a back support, the deflection at the spindle is not more than $\frac{3}{16}$". The spindle may be adjusted along the toggle bar to accommodate various placements of work. The spindle assembly may also be removed so bar can accommodate a special pressure pad to meet the users' requirements. The toggle action of clamp applies and releases pressure instantly. This model V-1100 measures 14⅝" in height; 9⅞" overall length; and 6 lbs. weight. For further details write LAPEER MFG. CO., 3056 Davison Rd., Lapeer, Mich., or use INFORM-A-GRAM Key No. 649-C.

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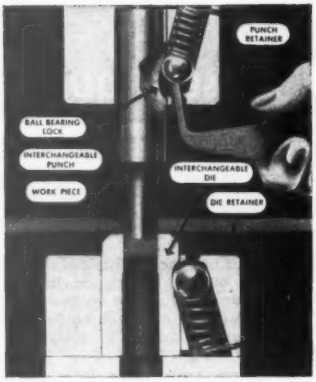
Quickly Inserted . . . Rigidly Held!



Allied's R-B Interchangeable Punches and Dies are quickly inserted—rigidly held for accurate, trouble-free punching in the metal-working and plastics industries. They are available from stock in standard round, oblong and square shapes of almost any required size. Specials of any size, shape or material are promptly furnished to your specifications . . . and delivery dates are dependable.

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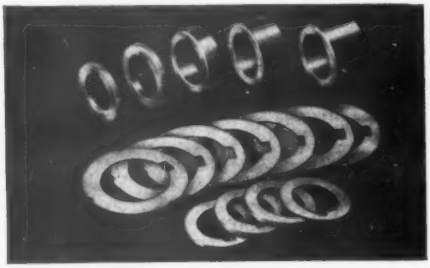

MACHINISTS HAVE LEARNED TO RELY ON DE-STA-CO Arbor Spacers and Shims for milling, slitting, gang-saw set-ups and for shimming gears and bearings. De-Sta-Co long-life steel Spacers are packaged in a standard range of sizes from ⅜″ to 4″ hole diameter, up to 5½″ outside, thicknesses from .001″ to .125″, all *with keyway.* Shims are stamped and coined to commercial tolerances in the same preferred sizes, *without keyway.*

Special spacers—thicknesses greater than .125″—are also available in popular sizes, machined from bar stock, hardened and ground, with standard keyways and thickness identifications.

Handy spacer kits of 19 graduated decimal thicknesses are stocked by Mill Supply Dealers in principal industrial centers. *Order your Packaged Precision Today.*

Your De-Sta-Co Toggle Clamp Catalog No. 47 is waiting for you. *Send for it!*

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These Die Jacks eliminate old-fashioned, unsafe, prying or hammering methods. Just clamp on punch holder and turn handle. Punch holder is raised or lowered smoothly, always under control. PERSSON Die Jacks are precision built from fine steel and alloys—a tool every tool maker will want for his tool box or bench drawer.

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Severance TUBING CUTTER GROUP - FOR FAST DEBURRING OF EVERY MACHINEABLE TYPE TUBE ...

TUBE DEBURRING CUTTERS (Standard)

18 Standards in H.S.S. and Cemented Carbide

ADJUSTABLE TYPE

Adjustable from 1/2" - 2-1/2" O.D.—for short runs

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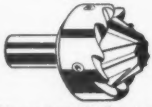

23 sizes from 3/16" - 2-1/2" O.D. — Chatterless

SOLID TUBE DEBURRING CUTTERS

16 sizes from 1/4" - 1-5/8" O.D. — H.S.S. and Carbide

SPECIAL TUBING CUTTERS

From light hand-deburring up to close tolerance deburring, chamfering, flaring . . . For working non-ferrous metal, steel (including stainless) and plastic tubing . . . For combining reaming, sizing or flaring with end facing and deburring . . . Whatever the operation or material, Severance HSS and Cemented Carbide Tube Deburring Cutters are TOPS in performance — long life — economy.

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Science • Research • Methods • Tooling • Production • Trade News and Reports

German Rolling Mill Practices Surveyed

Large quantities of compound metal plates were produced for the German chemical industry during the war by hot-roll welding of stainless steel surface sheets to plain steel backing plates according to a recent report available from the Office of Technical Services, Department of Commerce.

Surveying rolling mill practices in 16 German firms, this report was prepared for the British Intelligence Objectives Sub-Committee.

Compound plates produced at the Deutsche Roehrenwerke A. G. at Muelheim were made with one or both surfaces protected by stainless steel, copper, silver, brass or other metals. Among the advantages claimed for compound plates made by hot rolling are economy in use of alloys, ease of fabrication, high strength combined with resistance to chemical attack, resistance of the backing plate to sulphur, and the feasibility of constructing plates with magnetic properties but with an austenitic surface layer.

In the process the plates are built up in a pack; the pack is sealed by welding and piping is provided to pass a hydrogen atmosphere between the metal surfaces. After heating to rolling temperature, the pack is rolled in an ordinary plate mill.

Compound steel plates examined by the investigator averaged about one centimeter in thickness with a stainless steel sheathing of about one to two millimeters. The investigator noted in one instance that the penetration of a plate by shrapnel did not separate the stainless sheet from the plain steel backing.

The Ilseder Huette firm at Peine was the only mill in Germany rolling broad flange beams up to 1,000 by 300 millimeters. A Universal mill built by Klein of Dahlbrueck in 1914 consisting of two high stands with undriven vertical rollers was used for this purpose. The two stands were arranged in tandem and were driven by a single reversing motor through standard gear box and pinion gear. The mill crew consisted of three operators, three mill hands and a foreman.

Other German practices considered of particular interest by the investigator dealt with soaking pits, ingot cars, blooming mills, bloom and slab shears, deseaming, intermediate and structural mills, roller straighteners, billets and sheet bar mills, plate mills, broad strip mills, strip and skelp mills, merchant and rod mills, cold strip mills, individually driven rollers, hot steckel mills, and drum rolling mills.

The 168-page report, containing brief descriptions of these practices and numerous illustrations, may be obtained by writing to the Office of Technical Services, Dept. of Commerce, Washington 25, D. C., requesting "Rolling Mills; Note on German Practices" and enclosing a check or money order in the amount of $12, photostat; or $4, microfilm.

Annual Convention Of Body Engineers

The American Society of Body Engineers' Annual Convention, to be held at the Rackham Memorial Building in Detroit on November 5th, 6th and 7th, promises to highlight the season for Automotive Engineers.

Three days' technical sessions will include "Styling", "Production Engi-

neering", "Small Cars", "Seating Comfort", "Truck Bodies", "Buses and Coaches", "Materials in Body Construction", and "Passenger Car and Body Engineering".

At open house, to which the public is invited on the evening of the first day, the Society will have as principal speaker Dr. Allen A. Stockdale who is ranked as one of the most dynamic and well informed speakers in the nation on industrial problems. He has done social research work with employees throughout industry, as well as with scientists, engineers, employers and educators. He appears through the courtesy of the National Industrial Information Committee of the National Association of Manufacturers.

Economical Way To Make Good Basic Bessemer Steel

Fifty-ton converters built in Germany during the war are an economical way to make large quantities of good basic Bessemer steel, according to a British report on German metallurgy.

Sheets for electrical transformers with a guaranteed energy loss of 0.9 watts per kilogram were produced by only one German firm according to another British report on electrical steel.

Declining supplies of high-grade iron ores in Europe may increase the importance of the Bessemer process, the British investigators point out. While 25 to 28 tons capacity has long been standard for German installations, recently built 50-ton furnaces have given good results. By using a shallow converter bath, German experts said they could appreciably reduce the nitrogen content of the steel. The quality of this basic Bessemer steel was high enough so that it could often be substituted for open-hearth steel during the war.

Alloy steel has been made in Germany at very low cost by melting a rich alloy charge in a 50 to 60-ton electric arc furnace, casting this charge in a ladle and pouring into it open-hearth or basic Bessemer steel. The steel thus made was said to be of uniform quality and low inclusion count, the investigators report.

The production of light alloys was one of the most interesting developments found in Germany. Not only were melting, holding and casting processes considered noteworthy by the investigators, but outstanding features were also seen in the heavy forging and extrusion presses.

The best German sheet steel for electrical transformers was produced from steel ingots supplied by Krupp. The steel had a guaranteed energy loss of 0.9 watts per kilogram at 10,000 gauss and a frequency of 50 cycles per second. This steel contained from 4.2 to 4.5 percent silicon, 0.15 percent manganese, very small amounts of sulphur, nickel, phosphorus and chromium, and no aluminum. The maximum carbon content was 0.1 percent; 0.06 to 0.08 percent was considered best.

In contrast to British practice, German electrical steel was entirely refined in basic electric arc furnaces.

Orders for the reports: (1) Iron, Steel, and Non-Ferrous Metal Works Plant and Machinery, PB-60387, photostat—$9, microfilm—$3; and (2) Manufacture of Electrical Steel Sheets in Germany, PB-65673, photostat—$7, microfilm—$3, should be addressed to the Office of Technical Services, Dept. of Commerce, Washington 25, D. C., and should be accompanied by check or money order payable to the Treasurer of the United States.

IFMA Contest For Trade Papers

To promote the publication of more and better articles in the trade press describing the economic advantages obtained by the use of modern industrial furnaces, kilns and ovens, the Industrial Furnace Manufacturers Association announces a cash prize contest with $1500 in rewards for papers published during the period from October 1, 1947, and September 1, 1948.

Awards will consist of $1000, first prize; $300, second prize; $200, third prize; plus special non-cash awards made to the magazines publishing the three winning awards.

Formal rules and other details can be obtained from the Industrial Furnace Manufacturers Association, 420 Lexington Ave., New York, N. Y.

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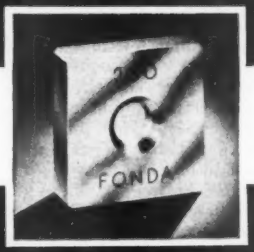
FOR
Every GAGE-BLOCK *User*



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Square style gage blocks of Lifetime-Carbide are now available for new use or replacement of any square gage block set.

INDIVIDUAL BLOCKS & COMPLETE SETS

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- Outlast more than 100 steel gage blocks
- Will never grow or shrink
- Have the highest resistance to corrosion
- Retain original surface finish longest

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NATIONAL MACHINE TOOL CO.
DEPT. 137-K • RACINE, WISCONSIN

Hydraulic Pumps And Power Units

(CONTINUED FROM PAGE 70)

In gear pumps the oil must not pass from the outlet to the inlet through the teeth as they mesh. To prevent this, a suitable sealing contact must be maintained between them at this point, and the teeth should completely fill the opposite tooth space. But if this is done effectively, fluid is also trapped between them and crushed.

This results in very high unbalanced loads on the shafts, either reducing the safe maximum pressures permissible or resulting in excessive heating of the oil. In the pump shown, the teeth are made with special form so that not only do the teeth exhaust all the oil from the spaces, but two or three lines of contact also are maintained to prevent leakage.

To eliminate crushing, special fluid channels are provided. Holes are radially drilled through the teeth and bottoms of the spaces. These holes communicate with grooves in the idler shaft so as to connect them first to the outlet chamber and later to the suction chamber. When connected to the outlet chamber, they prevent oil from being crushed.

The holes on the suction side eliminate aeration of the oil. Air bubbles in oil are undesirable, particularly in positive displacement metering circuits. In these circuits the accuracy of the feed is due to the homogeneity and non-compressibility of the oil. Any air, not dissolved in the oil, increases the compressibility and reduces the accuracy of control.

Note that the teeth in this pump are short, wide, and have a special form. This results in a rugged, long-lived pump, as can be explained by the following example.

One pump was tested in Detroit by a customer who was overhauling some hydraulic units in order to apply remote electrical control valves. Thinking that the ten-year-old pump would be worn, a 1500 psi pressure gauge was connected into the outlet without any bypass or relief valve. When the motor was started, the pump pressure went up so rapidly and high that the needle on the gauge went beyond 1500 psi and the gauge was broken. The air furnace cast iron gears in that pump had, of course, worn very little.

This particular design permits little leakage. The effect of pressure and temperature upon pump delivery is, therefore, very small. Figure 2 shows that over a temperature range from 70° to 120° F. the pump delivery changed only from 9.3 to 9.1 gpm while the pressure was maintained at 400 psi.

Gear pumps in general, however, have large unbalanced forces, and many places for leakage of fluid from the outlet to the inlet. Consequently, they are only moderately efficient mechanically and volumetrically, and are not generally used above 750 psi. Balancing methods are helpful, but increase the losses due to leakage. Large gear pumps are operated between 600 and 1200 rpm. Smaller pumps may be built for operation up to 3600 rpm.

Gear pumps can be made with two or three independent sections so that two or three circuits can be operated at once without affecting each other. One section can be smaller than the other, the small section serving as a clamp pump for holding pressures, while the large section can be used for traverse.

Small pumps can be placed at the end of such multiple gear pumps. For instance, a leakage pump can be added for the purpose of maintaining the level of oil in a lubricating chamber for gears in a self-contained sliding head, or an intermediate size pump can be added for clamping purposes in place of the lubricating pump. Even this pump can be duplexed so that from one shaft two independent traverse and clamp circuits can be operated. As many as five sections have been operated from one shaft.

One characteristic not usually known is the ability of a high grade pump to deliver at low speeds. An example of this is to use a gear pump as a brake. One application actually used a pump

to limit the speed by which men could normally close a large gate valve. It was necessary to prevent closing the valve too fast in order to avoid water hammer. On self-contained sliding heads which include a gear pump, it is a simple matter to inch the head forward or backward by slowly turning the main pulley by hand (the valve being in forward or return position).

Gear pumps are manufactured in various capacities from 2 gallons per hour to 50 gallons a minute. Small pumps delivering about 2 gallons per hour are priced under $15.00; larger ones delivering up to 50 gallons per minute cost several hundred dollars.

Piston Pumps

Piston pumps utilize reciprocating pistons or plungers, but are driven by a rotary shaft. Forces due to pressure are balanced and do not effect sealing members or sliding fits; hence high pressures can be pumped. For equal size, however, a piston pump generally delivers less fluid, is more complicated, and is more expensive than a gear pump.

Unlike gear pumps, the displacement per revolution can be changed; and more valving is required to alternately connect each compression chamber, first, to the inlet and, second, to the outlet port each revolution. This may be a rotary valve or it can be accomplished better by the use of ball valves. Here the leakage is extremely small, because pressure actually makes the ball valve seal better.

This can be demonstrated by the following experiment: Reduce the stroke of a ball valve pump to several thousandths of an inch until the delivery just balances leakage past the pistons at a pressure of 1000 psi with the outlet closed except to a pressure gauge. When the rotation of the pump is stopped, the pressure will be held by the outlet ball valves at one thousand pounds per square inch. Even after an hour the pressure will remain within several hundred pounds. Calculations will show that most of the pressure drop is due to the drop in temperature of the oil in the pipe.

A cross-section of such a pump is shown in Figure 3. A reciprocating piston is supported by a pivoted finger. The finger receives an up and down motion from the double row ball bearing eccentrically mounted on a drive shaft. When the finger rises, the piston tends to push oil from the chamber under the piston cap toward the inlet ball valve shown. Since this ball is closed by a spring, and is held shut by pressure, the oil continues to flow to an outlet ball. Due to its position the fluid opens this ball easily and flows into the collector groove connected to the outlet port.

When the piston stops its upward movement, the outlet ball is closed by its spring. As the shaft continues to turn, the bearing allows the piston to start downward, dropping the pressure in the compression chamber. When the pressure drops below the charge pressure (maintained at the pump inlet by a separate pump), the inlet ball opens. Fluid under charge pressure enters, keeping the piston down against the finger and bearing, thereby recharging the chamber for the next stroke.

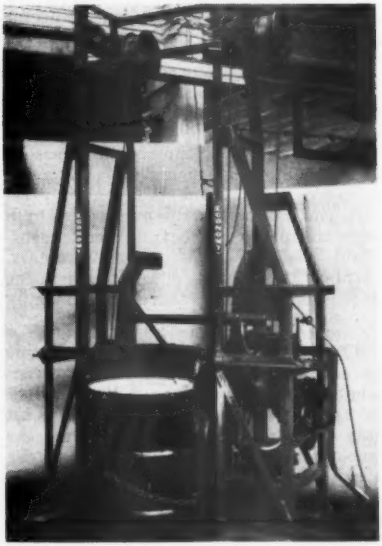
The delivery of this pump is variable by adjusting the amount of the eccentricity of the mounting of the bearing. In special purpose machines this need only be adjusted when setting up the machine. A view of the inside of the pump, Figure 4, shows the roller bearing (with an eccentrically positioned hole in the inner race) mounted on an eccentric portion of the drive shaft. The two eccentricities can be adjusted to give a total eccentricity ranging from their sum to their difference. Since each are equal, the stroke is thereby varied from zero to a ½" maximum.

A special form of finger is utilized here to keep the contact forces localized near the center of the piston. This form also results in a uniform motion of the piston which gives smoother pumping than with an unsymmetrical motion. An example of an unsymmetric motion is that obtained with a crank and connecting rod in an automotive engine where the motion during the first 90° of shaft rotation is less than the second 90°.

(TO BE CONTINUED)

Lifting And Dumping For Mixing

The Economy skip hoist is a semi-automatic type machine that lifts, empties and returns the barrel or drum to the floor without moving the machine. It is moved alongside the mixing kettle and remains there until the required number of dumping operations are completed. The drum is fitted into the cradle and held in place by a simple chain ar-



rangement. The drum can be raised to the dumping position by merely turning a switch.

These skip hoists are made in load capacities varying according to the requirements of the user and with the dumping height determined by the height of the tank or kettle into which the materials are to be dumped. The machine illustrated here, handles 500-lb drums and dumps the contents in a mixing kettle 5 ft. high. The drum reaches the dumping position in about 15 seconds.

The frame of the hoist is of structural steel, electrically arc welded throughout with uprights thoroughly trussed and cross braced and without hinging. Automobile type steer provides four point floor support and permits turning the machine in a very short radius. The ball bearing hoist unit with cut-spur gears, the high speed gears and the internal brake are wholly enclosed in a metal case and run in a bath of oil. The drum and pinion gears, completely guarded, run in grease. The dual braking system, an external band type brake operated by the controller, stops the lifting cradle and holds it at whatever point raised. In addition, an internal over-running clutch type brake automatically holds the cradle from falling should the current fail for any reason. Both brakes are integral parts of the hoist unit. The drum machine is scored for hoist cable with a floating cable connection to the drum to prevent bending. The speed of the cable lift is 24 fpm.

Economy Engineering Co., Dept. DJ, 2659 W. Van Buren St., Chicago 12, Ill., will furnish complete specifications, or use INFORM-A-GRAM Key No. 277-C.

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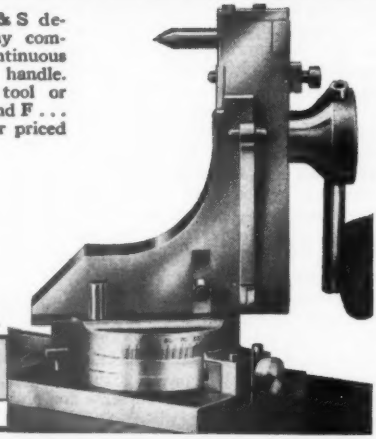

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Roto-Finish Efficiency Increased

The efficiency of the Roto-Finish mechanical process for finishing and deburring parts has been greatly increased by the new 60" Wet Process machine, just announced by the Sturgis Products Co. This machine is available with one to five compartments, permitting simultaneous processing of that many different parts. A cam lock enables the operator to remove the door easily and quickly so that a minimum of time is required to load and unload. This door lock has a spring feature which allows any gases that might build up in the cylinder to escape. The lining of the octagonal cylinder can be easily removed, permitting speedy relining with fitted hard wood.

Predetermined combinations of chips and compounds to finish and deburr at the same time are used in the machine. This process is a precision grinding operation that leaves parts with a bright, high color finish, highly suitable for plating. All parts are uniform as to their surface and all rough edges and sharp corners are removed.

Parts are placed in a woodlined compartment of the barrel-shaped machine and the selected chips and compounds are added. The mass generates as the barrel revolves, producing a grinding action. This action is controlled entirely by the type of chips and compounds, the barrel speed, and length of the time cycle.

This 60" machine is particularly suited to production finishing of parts, increasing the savings in time and labor gained by the mechanical Roto-Finish method. The Roto-Finish wet process used in this machine cuts the time cycle from 25% to 50%, depending on the type of part processed. With parts having a brighter, more uniform finish, plating costs are in turn reduced. Another important saving is the elimination of hand labor, since one operator can handle several of these machines.

These Roto-Finish machines are especially adapted to finishing all types of hardware for automotive, plumbing, household appliances, etc. Chip separators, which can be had in either mechanical, magnetic or manual types, are also available to speed up production.

Further information regarding this machine and the Roto-Finish mechanical finishing process may be obtained from Sturgis Products Co., Dept. DJ, Sturgis, Mich., or by using our postage-free INFORM-A-GRAM Key No. C17-C.

New Type Ram For Crank Shapers

The vastly improved ram, developed by Smith and Mills Company for their 12", 16", 20", 25", 28", and 32" crank shapers, completely eliminates the old style slot which was a traditional weak point of the conventional ram. It is no longer necessary to lock the ram position manually, since the new self-locking feature automatically maintains the position at the point set by the operator.

It was found that cutting a slot in the top removed much of the strength inherent in the channel and that no amount of lengthwise ribbing could materially strengthen the section. The best way to correct this condition was to eliminate the slot and provide continuous cross ribs to stiffen the ram bearing surface. By doing this, Smith and Mills greatly increased the strength of the ram without increasing the weight.

In this construction, the ram carrier is mounted on the bottom of the ram. The thrust of the cut is taken on a large diameter ram adjusting screw mounted between ball thrust bearings. Backlash between the screw and ram carrier is prevented by an automatic compensating double-nut, which furnishes sufficient friction to keep the adjustment from changing under the heaviest cuts. To position the ram, it is only necessary to turn a conveniently located shaft.

Additional details are available from Smith and Mills Company, Dept. DJ, Ohio. INFORM-A-GRAM Key No. H1-C.

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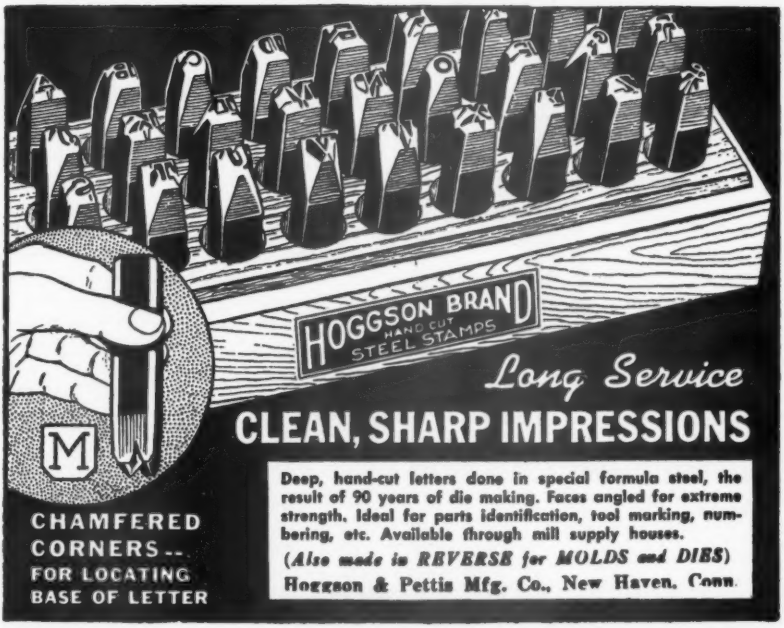

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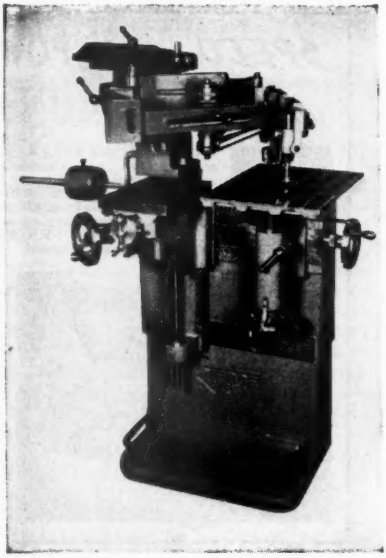

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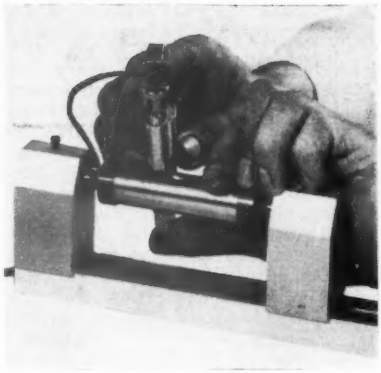
Electronic Measuring Of Work-In-Process

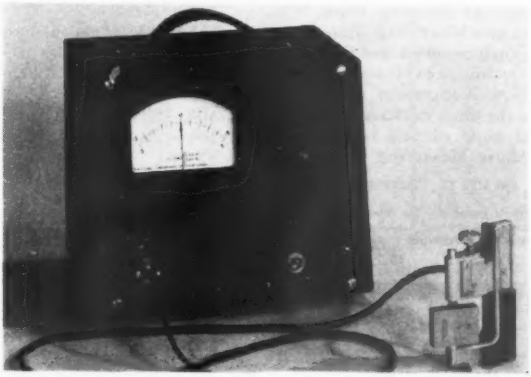
This new electronic micrometer, with its sensitive indicating and amplifying circuits, has been developed by the Graham-Mintel Instrument Company for the express purpose of making extremely accurate measurements of a workpiece while it is in its processing position; for instance, checking the diameter of a cylindrical grinding job while the work is between centers on the machine. This obviates the necessity of removing the work from the machine, of subjecting it to temperature changes, and of subjecting it to new and different stresses due to repositioning it in a measuring machine. The Graham-Mintel method measures the size of the work under the absolute conditions prevailing while the work is being sized; therefore, extraneous variables are at the irreducible minimum.

The apparatus consists of the measuring head or micrometer proper and the indicating meter mounted in the cabinet which also houses the electronic amplifier circuits. A flexible, shielded cable between the two permits free manipulation of the micrometer at the work position.

The scales of the indicating meter are calibrated to give two measuring ranges. A dual circuit with selector switch is provided whereby the full scale reading of the meter may be either plus and minus .0005" or plus and minus .005". With ten scale divisions of generous size on each side of zero, this means that in the first instance each scale division represents fifty millionths of an inch; and values in increments of ten millionths of an inch may be estimated with reasonable accuracy.



The micrometer head proper is light in weight but of rugged construction, and is temperature-insulated against handling. The instrument is set to the basic dimension by gage blocks; basic dimension being zero reading on the meter scale, the actual dimension being read as basic plus or minus the meter reading on either the .005" or .0005" scale.



Above: The ease of manipulation of the Graham-Mintel Electronic Micrometer permits a degree of sensitivity in precision measurements impossible to attain with bulkier and heavier equipment that cannot be employed at the working position. Left: The measuring micrometer head, the indicating meter and connecting cable.

Air-Hydraulic Press Licks Bottleneck

Licking a bottleneck in a Henry Moss Co. assembly line was the job encountered by the Air Hydraulic Press. Making one operation out of three, the Air-Hydraulic Press was put to work driving three Parker Kalon No. 10 drive screws to assemble the pressure plate and base plate of the M6A Electric Iron.

In a recent questionnaire filled in relative to this new time and effort saving operation, Henry Moss Co. described how Air Hydraulic Presses eliminated the need for hand operation and enabled the operator to use both hands for press feeding.

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Information may be obtained by writing Air-Hydraulics, Inc., Dept. 51, 401 Broadway, New York 13, N. Y., or use INFORM-A-GRAM Key No. J51-A.

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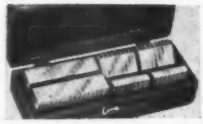

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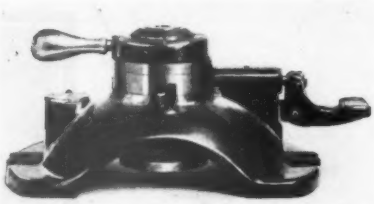

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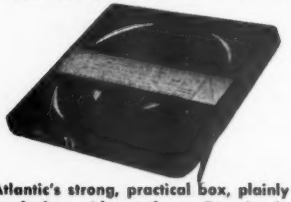

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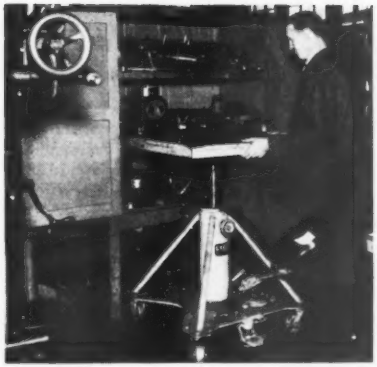


Fig. 5. Hydraulic elevating table built by Lyon-Raymond Corporation shown leveled to transfer a die from storage to a press.

(CONTINUED FROM PAGE 66)

chine to another, so that in case of die breakdown, the table serving it can be shifted to another press without waste of time in transferring stock.

The top of the Lyon-Raymond strip and stock feeding table consists of one rigid section, same length as the base, plus two removable extensions designed to support longer loads. These extensions are removed by simply lifting them to a vertical position.

The pump is joined to the cylinder by flexible hose which permits placing of the pump where it is most convenient to the machine operator, and when it is necessary to move the table the pump may be suspended from the table top.

Streamlining has also been applied to the handling of dies in and out of presses and storage racks. This is largely due to the elevating tables which have been developed.

It is not unusual for the larger sized dies to weigh up to 500 pounds or more and those of the automobile body type reach a weight which requires a hoist or crane to handle them. Under ordinary conditions three or four men are required to move dies in and out of presses and storage racks. These men are likely to be injured, expensive dies dropped and damaged, and time lost in handling these costly parts.

Economy Engineering Co. is building the Shoplifters in two types: manually operated and electric.

Fig. 6. Lyon-Raymond hydraulic high lift truck shown being positioned for transferring a die to punch press bed.

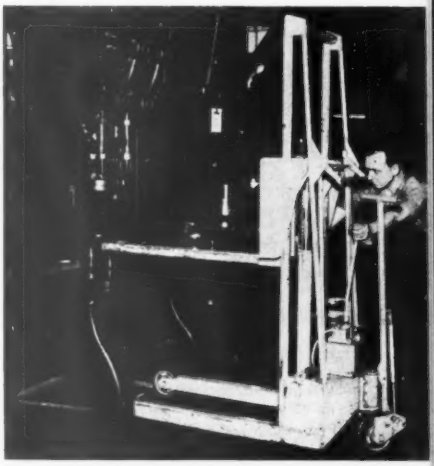


Fig. 7. Portelvator built by The Hamilton Tool Company is a portable elevating table used extensively for moving heavy dies and fixtures, to support overhanging work, and load and unload heat treating furnaces.

Fig. 8 illustrates Hamilton Tool Company's Automatic Stock Positioner. As stock is fed off this table into a press, the table raises at a rate that keeps the top of the stock always at the desired height.

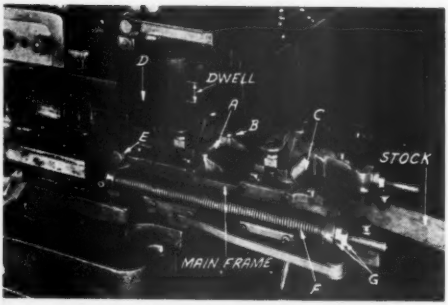


Fig. 9 shows the operating parts of the Dickerman Die Feed. It is constructed for automatic operation and receives its motive force through the movement of cam D actuated by the press ram.

With the hand operated table, Figure 3, one man alone can safely handle heavy loads up to 500 pounds. To facilitate moving heavy dies on and off the platform from storage racks and presses, a die pulling winch is also available, mountable on the uprights of the Shoplifter. As an additional aid in moving heavy dies, a roller frame mounted on the platform can be provided.

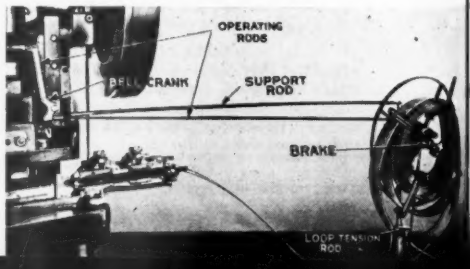
Height and width of the Shoplifter are such that ordinary doorways can be cleared and the lifter used in narrow aisles and alongside other machinery.

To lift the loaded platform, the crank handle is turned clockwise. Releasing the handle automatically holds the load at whatever height has been reached. There are no pawls or brakes to set, the platform remaining at the required height without further attention from the operator. To lower the load, the crank handle is simply turned in the opposite direction and the platform travels down in perfect safety. At no time is it necessary to manually set or release the pawl, this being automatically done through the cam-operated braking mechanism, an exclusive feature of the Shoplifter. Crank handle pressure under a capacity load is only 20 to 25 pounds.

In the electric Shoplifter, Figure 4, the hand hoist is replaced with an electric unit of compact and sturdy design, other framework details remaining identical with the original Shoplifter. The electric Shoplifter has been engineered for those continuous duty jobs where a hand operated hoist is impractical or unduly tiring to the operator. To operate the lifter, simply plug the conductor cord into the nearest lamp socket, and then turn the controller handle to the "up" or "down" position. A dual braking system with self-locking worm gear and band type external brake is provided which automatically holds the load when handle is in "off" position.

Two types of die handling tables are built by Lyon-Raymond. Figure 5 illustrates the hydraulic elevating table elevated by the operator by means of

Fig. 10 illustrates the Dickerman Automatic Stock Reel. Stock can be automatically fed at a controlled rate as required by the die.



the foot pump located on the base. The table is being leveled preparatory to sliding a die from the storage rack onto the table for transporting to a punch press. This table is also used profitably in handling materials around heat-treating furnaces for loading and unloading.

Figure 6 shows the high lift truck being used to place a die in a press. The operator is leveling the table by operating the two speed double acting 4-piston hydraulic hand pump.

The Portelvator, Figure 7, built by The Hamilton Tool Company, is designed for handling dies from storage racks to punch presses, to charge or discharge heat-treating furnaces, and other bulky material handling jobs where raising and lowering the load is an advantage. Its four point support and fast and slow feed lift mechanism are outstanding features of this table.

The automatic Stock Positioner, Figure 8, is made up basically of the Portelvator. The positioner will support a pile of sheet stock that is to be fed into a press, brake or shear. The table is lowered until the top of the pile of stock is at the most convenient height for feeding. As the stock is fed into the machine, the table raises at a rate that keeps the top of the diminishing stack always at the desired height. The electric controls and motor that govern this movement are actuated by an arm and roller that "rides" on top of the pile.

The automatic feeding of coiled strip materials into dies is another step in the streamlining of press room equipment. Dickerman Die Feeds and Automatic Stock Reels can be combined to get an automatic press operation. The Die Feed, Figure 9, operating free of any connection to power shaft of the press, can be installed at will on any idle punch press, which is particularly advantageous for short runs or rush work. Die Feeds can be successfully applied to feeding coiled materials, such as steel, brass, copper, aluminum, paper, mica, rubber, fibre, plastics, etc., and will feed highly polished materials without scratching or marring the finish in any way. They can be mounted on the die-set or bolster plate of the press in any position for any style die, making it possible to feed into the die from left to right, right to left, front to back, back to front or at any angle. Two or more Die Feeds may be used on the same die in order to feed separate ribbons from different directions, work on them, and finally, assembly.

The feed consists of a pair of gripping cylinders (A), Figure 9, mounted on a slide (B) and a pair of gripping cylinders (C) attached to the main frame of the feed in a fixed position. Operating on the principle of an overriding clutch, these gripping cylinders rotate freely in one direction and lock instantly against rotation in the other direction. This principle makes free movement of stock between gripping cylinders possible in one direction only.

On the down stroke of the press, operating cam (C) engages the cam roll (E) of the slide (B), causing slide (B) to move toward the fixed pair of gripping cylinders (C) compressing main spring (F). During this part of the feeding cycle, gripping cylinders (C) grip the stock and prevent it from moving back out of the die; gripping cylinders (A) roll freely over the stock to a new gripping point. (Stock in die is worked on while cam roll is on the dwell area of cam (D).) On the up stroke of the press, slide (B) carrying gripping cylinder (A) is returned to its original position—as set by feed length adjustment nuts (G)—by pressure of main springs (F). During this part of the feeding cycle, gripping cylinders (A) grip the stock and move it forward a distance equal to the feed length. Gripping cylinders (C) allow stock to pass freely into the die. Feed length can be adjusted from 0" to the maximum capacity of the equipment in .001" increments.

Because the Die Feed is automatic in operation, the factor of human error is reduced to a minimum, resulting in savings of materials and costly die repairs as well as labor.

The Dickerman Automatic Stock Reel, Figure 10, automatically unreels stock from either the top or bottom of a coil at a controlled rate as required by the die being fed. Power for operating the stock reel is obtained from the press and therefore the reel requires neither electric motor nor gear reducer. A spring

(CONTINUED ON PAGE 133)

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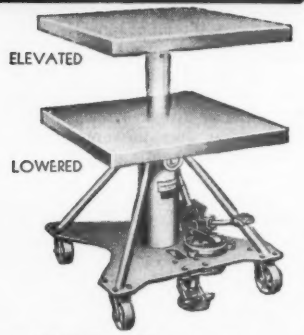

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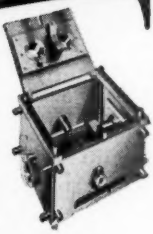

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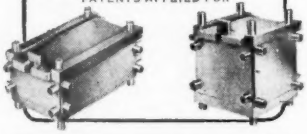

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WELDING AND BRAZING FLUXES which do not cast off objectionable fumes, gases, red flame or smoke are the result of thirty years of metallurgical research combined with actual job experience on all types of welding and brazing. Complete satisfactory performance is guaranteed for the "National" fluxes which are available in four types: for welding cast iron; brazing iron, steel, malleable and brass castings; brazing grey iron castings; and brazing brass, bronze, and copper. Complete information on these fluxes can be obtained by writing WELDING EQUIPMENT & SUPPLY CO., 225 Leib St., Detroit 7, Mich., or use INFORM-A-GRAM Key No. 580-C.

VERTICAL STROKE GRINDER, equally efficient for mass production or small lot grinding, is reviewed in an illustrated folder issued by O. S. Walker Company, Inc. Features of its flexibility, the self-contained Hydraulic Unit for automatic raising and lowering the grinding head, rapid traverse and adjustable minute grinding feed, and other parts, are discussed. Address request for this folder to O. S. WALKER COMPANY, INC., Dept. 5-11, 201 Rockdale St., Worcester, Mass., or use INFORM-A-GRAM Key No. 511-C.

A DEVICE FOR ELIMINATING BLADE BREAKAGE ON BAND SAWS is featured in a folder distributed by the Paddock Tool Co. Ball bearing band saw guides built in Models No. 6 and No. 10 assure constant support to the saw, prevent blade crystallizing, afford greater safety protection and improve machine operation. Illustrations and further details are given in the folder. Copies are available from THE PADDOCK TOOL COMPANY, Dept. 84, 1418 Walnut St., Kansas City 6, Mo., or use INFORM-A-GRAM Key No. F84-C.

A COMPREHENSIVE STORY ON SURFACE ROUGHNESS MEASUREMENT and its relationship to production and quality control is given in a 6-page illustrated bulletin announced by Physicists Research Company. This new

bulletin includes suggestions on establishing a surface roughness specification and control system. It also explains how the Profilometer is used (1) to obtain a positive check on roughness specifications in definite microinch units over any desired length of surface; (2) to shorten or eliminate production operations; (3) to detect impending dimensional errors before they occur; (4) to permit more accurate dimensional control; and (5) to obtain a more consistent finish for cutting tools. Copies may be requested from PHYSICISTS RESEARCH CO., Dept. 7-73, 321 South Main St., Ann Arbor, Mich., or use INFORM-A-GRAM Key No. 773-C.

A LIST OF TYPICAL INTERNAL GRINDING JOBS, with recommended Bay State wheels, is given in a recent bulletin as a guide for determining the type and size of wheel to do the job right. Grinding the inside diameter of

a steel casting and grinding an airplane connecting rod are some on-the-job illustrations shown of numerous possible operations. Request bulletin from THE BAY STATE ABRASIVE PRODUCTS CO., Dept. 2-05, 1 Union St., Westboro, Mass., or use INFORM-A-GRAM Key No. 205-C.

FOR LOCATING GEAR TROUBLES, Michigan Tool Co. has developed two machines to meet virtually every demand for running two mating gears together. Model 1127-B is equipped with an individual drive and brake for each spindle and Model 1129 for testing larger size gears. Descriptive literature giving specifications is available from MICHIGAN TOOL CO., Dept. 47, 7171 E. McNichols Rd., Detroit, Mich., or use INFORM-A-GRAM Key No. 47-C.

"DIE CASTINGS", an attractive eight-page booklet, has recently been issued by Harvill Corporation. The booklet covers the services offered in the field of die casting by Harvill,

and is illustrated with photographs giving an excellent pictorial presentation of their modern die casting methods and the many additional services the company offers. Copies may be obtained by writing on company letterhead to HARVILL CORPORATION, Dept. TDJ, 6251 W. Century Blvd., Los Angeles 45, Calif., or use INFORM-A-GRAM Key No. L52-C.

DESIGN AND CONSTRUCTION FEATURES of Monarch Machine Tool Company's 10-inch sensitive precision toolmakers' lathe, model EE, are covered in a 24-page Bulletin, No. 302. It contains a number of illustrations, including several views of the electrical and mechanical details of the equipment. Complete specifications are listed and both standard and extra equipment are illustrated and described at length. On request, copies will be sent from THE MONARCH MACHINE TOOL CO., Dept. 5-38, Sidney, Ohio, or use INFORM-A-GRAM Key No. 538-C.

DESIGNED AND CONSTRUCTED TO PERFORM WITH EXTREME PRECISION, built for long life, the Cleereman jig borer and drilling machines are reviewed in recent catalogs Nos. 400 and 310. Various models of each are illustrated showing details of constructions, descriptive specifications are listed as well as accessories for greater adaptability are included. These catalogs and others are available from BRYANT MACHINERY & ENGINEERING CO., Dept. 54, 400 W. Madison St., Chicago, Ill., or use INFORM-A-GRAM Key No. L54-C.

FOR MACHINE POSSIBILITIES AND THIER SIMPLIFICATION, Bunell Machine & Tool Co. now offers as part of its service an out-plant engineering check-up to industry wherever there is a need for it. A new booklet entitled "A Man Friday" gives information on this service which includes analysis and review of equipment and procedures to determine solution of problems. Copies are available upon request from the BUNELL MACHINE & TOOL CO., Dept. 8-86, 1601 East 23rd St., Cleveland 14, Ohio, or use INFORM-A-GRAM Key No. 886.5-C.

A NEW FEDERAL-METRICATOR AIR GAGE 12-page bulletin has been precisely and carefully compiled to instruct people who may be interested concerning the place the method of gaging dimensions by air takes in inspection. It emphasizes the particular use of the air gage, which makes it fit into some requirements better than others, and outlines clearly the simplicity and characteristics of the air gage. Various illustrations show where the air gage is used to better advantage than other methods. Copies are available from FEDERAL PRODUCTS CORPORATION, Dept. 4, 1144 Eddy St., Providence, R. I., or use INFORM-A-GRAM Key No. 4-C.

TWO MODELS OF "DI-LIFTS" FOR MOVING, LIFTING, lowering dies, and supporting over-hanging work, are illustrated in recent literature issued by Montgomery and Co. Model A, one-ton capacity, can be used as a portable work bench. Model B, with a capacity of 500 pounds, is ideal for loading and unloading trucks. Address request for copies to MONTGOMERY & CO., Machine Tool Accessories Division, Dept. 89, 53 Park Place, New York 7, N. Y., or use INFORM-A-GRAM Key No. H89-C.

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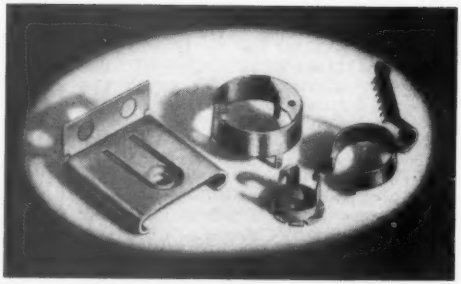

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FOR STARTING AND REVERSING MOTORS, Furnas Electric Co. reviews their complete line of electric motor controls in Catalog 46. Reversing drum controllers (also with thermal overload unit), multi-speed drum controllers, magnetic reversing switch, foot switches and other Furnas electric motor controls are illustrated, with descriptive information, connection diagrams, outline drawings, prices and specifications. Complete details of various styles, switching mechanism, applications, interlocks, and design features are included. Request copies from FURNAS ELECTRIC CO., Dept. 55, Batavia, Ill., or use INFORM-A-GRAM Key No. L55-C.

HOW BENDING OF WIDELY DIVERSIFIED SHAPES AND SIZES OF MATERIALS to a high degree of accuracy can be obtained with Pines Bender is discussed in a recent catalog issued by Pines Engineering Co., Inc. Illustrations of various machines for every purpose of bending tubular shapes, serpentine bends, stacked coils, return bends square and rectangular tubes, round coils, and special rolled and extruded sections are shown, as well as details of the automatic operation features and a typical set of bending tools. Basic principles of bending practices are also discussed and supplemented with sketches. Address re-

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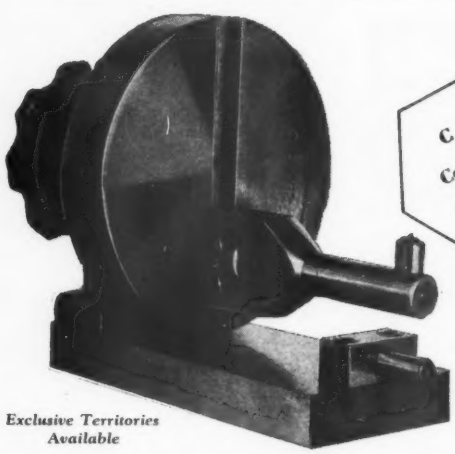

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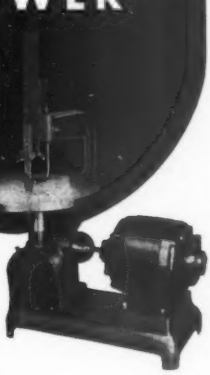

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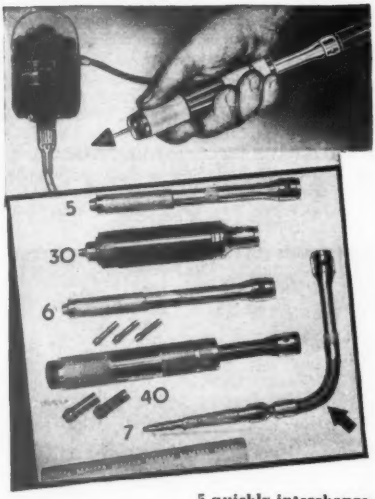

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RECENT ADVANCES IN DESIGN AND APPLICATION in the Gisholt line of balancing machines, lathes, superfinishers and special machines made for production requirements in many fields of manufacture are briefly covered in a current catalog. Illustrations and specifications of various models and types of each group are shown; details of hydraulic speed selector and standard tools and chucks are included. Copies are available upon request from GISHOLT MACHINE CO., Dept. 3-03, Madison, Wis., or use INFORM-A-GRAM Key No. 303-C.

A TEN-PAGE INFORMATIVE CATALOG, describing a complete line of light gage resistance welders of the bench and floor models from 1 KVA to 7½ KVA, has recently been

issued by Weldex, Inc. An interesting feature is three pages of illustrations of typical applications, including several unusual examples of projection and spot welding, from wire of .004" diameter up to 14 gage cold rolled sheet. Catalogs may be obtained by writing to WELDEX, INC., Dept. K, 7303 MacDonald Ave., Detroit 10, Mich., or use INFORM-A-GRAM Key No. L41-C.

A RECENT ADDITION TO THE REID PRECISION HAND FEED surface grinder line, Model 48 (exhibited at the Machine Tool Show), is described and illustrated in a recent catalog. Designed for smaller work, it serves as a handy auxiliary machine in any tool room or shop, relieving the larger grinders. Address request to REID BROTHERS CO., INC., Dept. 38, Beverly, Mass., or use INFORM-A-GRAM Key No. F38-C.

LATEST ADDITION TO THEIR LINE OF POLISHING AND F:NISH'NG WHEELS is announced by Manhattan Rubber Div. of Raybestos-Manhattan, Inc., in current literature. The new polishing wheel offers extreme flexibility, and "cushion" action of this wheel is due to the fact that the wheel is bonded with a specially modified compound of neoprene impregnated with abrasive grain. For finishing on stainless steel, glass, non-ferrous and precious metals, it is supplied in the finer abrasives grain sizes or with pumice, rottenstone or other mild abrasives. For further detailed information and literature, write to MANHATTAN RUBBER DIVISION, Raybestos-Manhattan, Inc., Dept. 53, Passaic, N. J., or use INFORM-A-GRAM Key No. L53-C.

A PANORAMA OF TYPICAL APPLICATIONS of the general line of material handling equipment, produced by Lyon-Raymond Corporation, is shown on the cover of bulletin 201. Featuring new construction techniques, carefully engineered design and easy, controllable hydraulic operations, the line includes hydraulically-operated lift trucks, elevating tables, pallet trucks, high lift trucks and sheet feeding equipment. Request this illustrated bulletin from LYON-RAYMOND CORPORATION, Dept. 374, 3661 Madison Ave., Greene, N. Y., or use INFORM-A-GRAM Key No. 374-C.

AN EXPANDED LINE OF HYDRAULICALLY OPERATED ASSEMBLY PRESSES is reviewed in bulletin PA-47, published by Colonial Broach Co. The line now comprises models from 10 to 50-ton capacity, offering high speed ram return, adjustable working stroke speed and length, and quick adjustable operating pressure through a combination of external pressure gage and dial type regulator. For complete information including specifications write for the bulletin to COLONIAL BROACH COMPANY, Dept. 26, Box 37, Harper Station, Detroit 13, Mich., or use INFORM-A-GRAM Key No. 26-C.

FOR ALL TYPES OF CARBIDE TOOL SHARPENING ON DIAMOND IMPREGNATED WHEELS and laps Stadoil diamond lapping oil lengthens the life of the cutter and wheel and produces a tool free from scratches. Current literature contains suggestions to the industrial trade for using and applying on diamond wheels and discs. Prices are included. Copies are available from CLEVE-

LAND TOOL & SUPPLY CO., Dept. 75, 1427 W. 6th St., Cleveland, Ohio, or use INFORM-A-GRAM Key No. L75-C.

GRINDING MACHINERY AND GRINDING WHEELS are presented in a general catalog No. 147, published by the Bridgeport Safety Emery Wheel Co., Inc. Various types of grinders: horizontal face, vertical surface, knife, floor stand, and cutlery are described, emphasizing features and detailing specifications. Buffing lathes, cut-off machines and grinding wheels are included, showing various types of each. Obtain this catalog from THE BRIDGEPORT SAFETY EMERY WHEEL CO., INC., Dept. 72, 1299 W. Broad St., Stratford, Conn., or use INFORM-A-GRAM Key No. L72-C.

FOR INTRICATE CUTTING and equally adaptable to any ordinary straight cutting work, the Beverly Junior Throatless Shear offers many advantages which are given in literature issued by The Beverly Shear Mfg. Co. The "S-3" Slitting Shear, with an adjustable shoe at the back of the upper blade holder, is also described in available literature. Specifications and price list are included. Address request for copies to THE BEVERLY SHEAR MFG. CO., Dept. 8, 3004 W. 111th St., Chicago 43, Ill., or use INFORM-A-GRAM Key No. G8-C.

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DESIGNED TO PERMIT A PRECISE COMPARISON of external dimensions between gage blocks (or master samples) and gages, jigs, or production parts, the SAGEM Vertical Metrological Comparator is ideal for high precision laboratory measurements. Bulletin MC-6 contains complete information; describes its rugged construction, and illustrates measuring heads that are available with either metric or inch scales. Write for bulletin to E. LEITZ, INC., Dept. 83, Metrology & Control Div., 304 Hudson St., New York, N. Y., or use INFORM-A-GRAM Key No. L83-C.

USERS OF PRECISION GROUND FLAT STOCK will welcome a new four-page folder released recently by Marshall Steel. A description of tests, heat treatment, grinding, and other basic facts are given as well as a table of sizes which is classified by thicknesses, weight and prices of each individual size. This feature will be a valuable reference to quickly determine weights and cost of stock. Write to MARSHALL STEEL, Dept. 41, Box 58, Lisle, Illinois, or use INFORM-A-GRAM Key No. K41-C.

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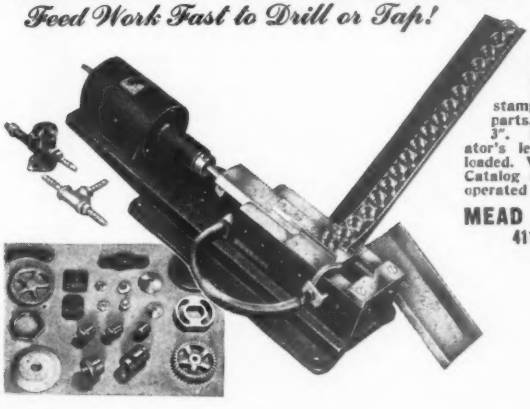

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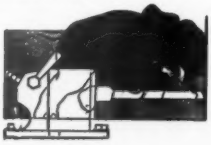

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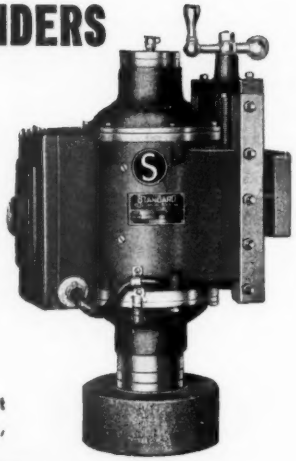

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"A TREATISE ON MILLING AND MILLING MACHINES", section two, covering the milling process; chip formation, surface finish and cutting fluids; power required in milling; and mounting of milling cutters, is off the press and now available as a splendid milling handbook. The second part of a 4-part unit which, at a later date, will be printed in whole, this book is priced at $1.00, postpaid. Get copies from The Cincinnati Milling Machine Co., Publications Department 2-33, Cincinnati, Ohio. INFORM-A-GRAM Key No. 233-C.

"PUNCH POINTERS", a new booklet ready for distribution by Allied Products Corporation, is written as a simple, concise reminder of the "do's" and "dont's" that have an important bearing on proper punch press setups, operations, and the proper care and use of R-B interchangeable punches and dies. Twelve pages are illustrated in an interesting cartoon style, with brief suggestions that can be easily understood. Copies are available without charge and will be supplied in quantities where distribution is desired throughout the press departments of any plant. Write to Allied Products Corporation, Richard Brother Division, Dept. 59, 4640 Lawton Ave., Detroit 8, Mich., or use INFORM-A-GRAM Key No. F59-C.

"THE IMPORTANCE OF PRE-SPRING ENGINEERING" is discussed in an issue of "The Mainspring," published by the Associated Spring Corporation. The six-page article contains detailed facts concerning basic information necessary for the spring designer and how this knowledge can eliminate spring failures. Various methods of approaching the problem for satisfactory spring performance are given, supplemented by formulae, and factual-humorous cartoons. Copies are available upon request from the Associated Spring Corporation, Dept. 43, 100 Wallace St., P. O. Box 506, Bristol, Conn., or use INFORM-A-GRAM Key No. K43-C.

HOW TO OBTAIN GREATER EFFICIENCY FROM DIAMOND WHEELS is discussed in a new handbook "Grinding Carbide Tools" prepared with the co-operation of various manufacturers of cemented carbides, to assist tool room supervisors and operators in selecting the proper grinding wheels and in employing the most suitable methods for sharpening and reconditioning their carbide cutting tools. Over 130 pages of practical information, divided into eight sections: wheels for grinding carbide tools, grinding single-point tools, chip breakers, hand honing of carbide tools, grinding multitooth cutters, miscellaneous grinding operations, how to get the most from your diamond wheels, centralized control and grinding of carbide tools and general information; diagrams and illustration of typical on-the-job scenes are included in the handbook. Copies are available upon request from Norton Company, Dept. 5-45, 1 New Bond St., Worcester, Mass., or use INFORM-A-GRAM Key No. 545-C.

SAFE AND EFFICIENT OPERATION METHODS are contained in a twenty-page booklet, "Portable Grinding Machines", one of a series being published by the Safety Committee of the Grinding Wheel Manufacturers Association. The booklet is fully illustrated to show correct and incorrect methods of mounting grinding wheels on portable machines; discusses means of avoiding wheel breakage; "high-speed" and "low-speed" machines; protective devices and methods; and provides tables for conversion of R.P.M. to surface feet per minute for wheels 1 to 8 inches in diam-

eter. Request copies from The Grinding Wheel Manufacturers Association, Dept. T, 27 Elm St., Worcester 8, Mass., or use INFORM-A-GRAM Key No. L65-C.

A SIMPLE YET COMPREHENSIVE REVIEW OF HYDRAULIC PROBLEMS is presented in an attractive booklet "Hydraulic Equipment" published by Shell Oil Company, Inc. The Booklet includes chapters on: hydraulic principles; hydraulic systems; hydraulic equipment; hydraulic oil requirements; performance characteristics; and maintenance and cleaning of hydraulic systems. Throughout its 44 pages, the booklet emphasizes that smooth, efficient, economical operation of any oil-hydraulic mechanism depends as much on the liquid which transmits the power as on the design, construction and operation of the mechanical parts. Copies are available upon request from Shell Oil Company, Inc., Dept. 4, 50 W. 50th St., New York 20, N. Y., or use INFORM-A-GRAM Key No. J4-C.

"INDUSTRIES ANSWERIGHT" by Charles Z. Smith, Sr., an ideal on-the-job reference book for the experienced mechanic as well as the man fresh out of school. Hundreds of practical problems fully illustrated have been taken directly from machine shops, engineering and production departments. Comprehensive outlines are arranged for systematically determining dimensions for standard and special thread gages. A very unique slide rule digit system is explained in detail, including examples. Eight-decimal-place tables of all the natural trigonometric functions to every minute; as well as other tables desirable for work that requires precision measurements are included in the book. Problems are presented in a most effective manner by using detail drawings with the unnecessary dimensions omitted. This informative book, 440 pages, 215 illustrations, 8½ by 11 inches, leathern cloth binding board covers, price $6.00 postpaid, is vailable from Genaflash Co., Dept. 82, 105 Grove Ave., Albany 3, N. Y.

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(CONTINUED FROM PAGE 121)

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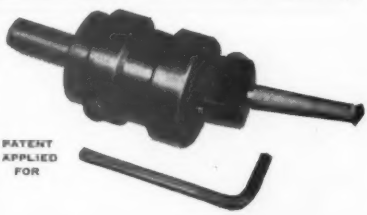

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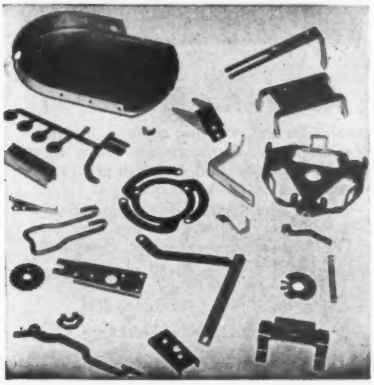

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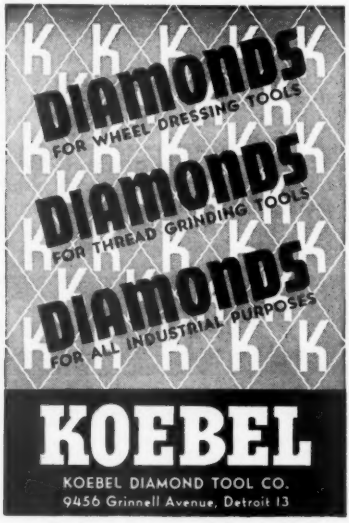

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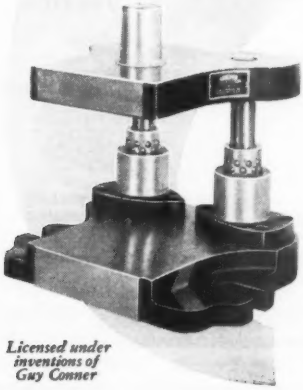

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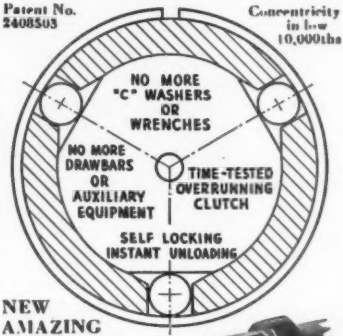
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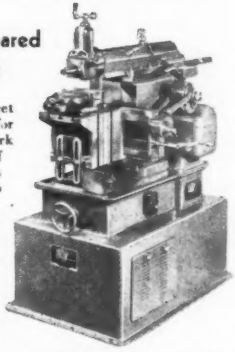

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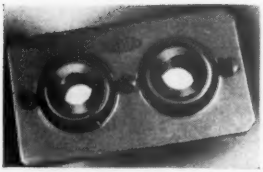

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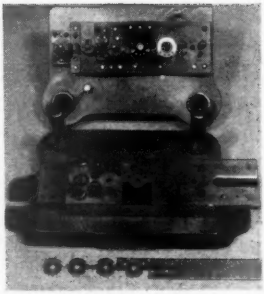

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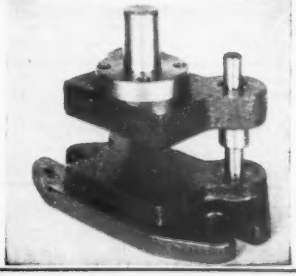

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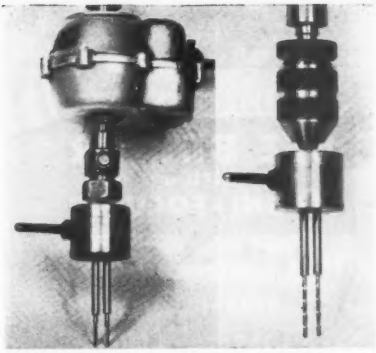

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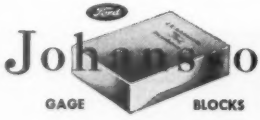

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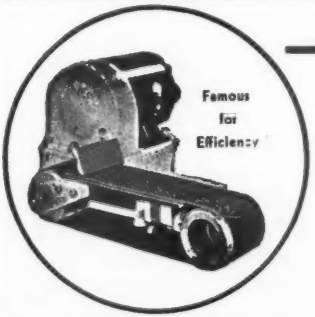

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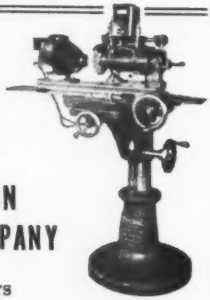

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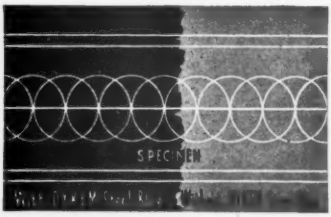

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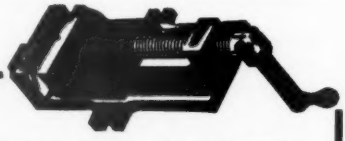

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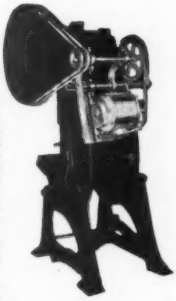

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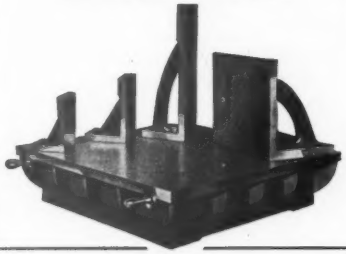

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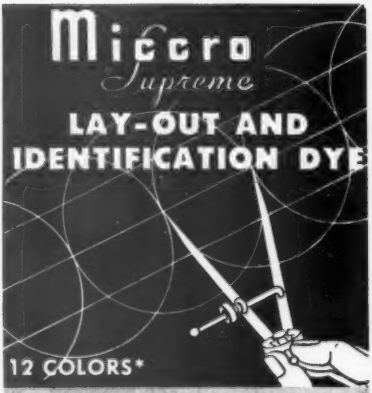

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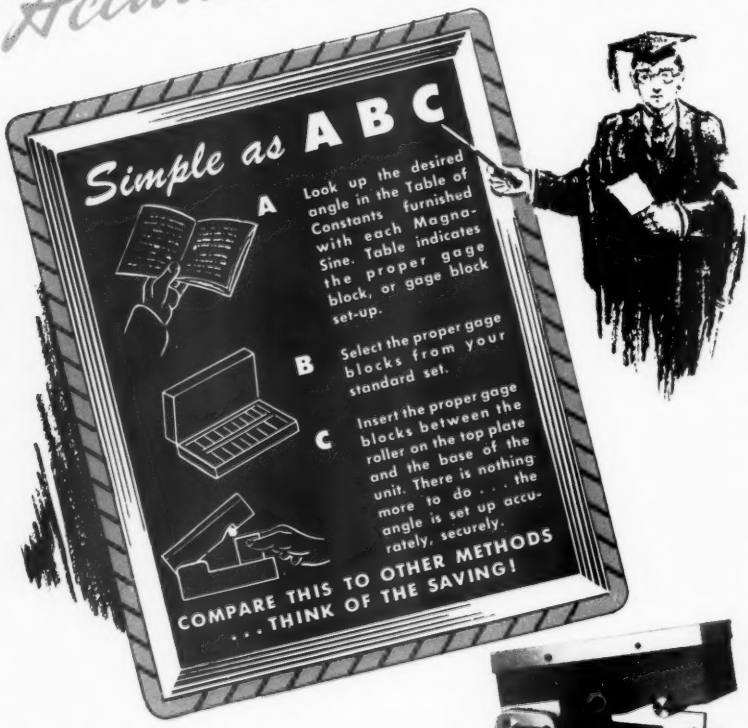
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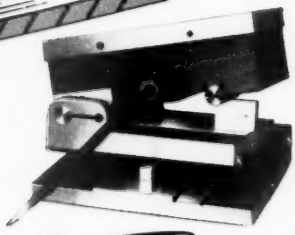

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